

Joshua Zahl

CONTACT INFORMATION	UBC Department of Mathematics Vancouver, BC V6T 1Z2 jzahl@math.ubc.ca ORCID 0000-0001-5129-8300
RESEARCH INTERESTS	Classical harmonic analysis, maximal functions, incidence geometry, additive combinatorics, sum-product theorems, combinatorial geometry, discrete and computational geometry.
EDUCATION	University of California, Los Angeles Ph.D., Mathematics, 2013 <ul style="list-style-type: none">◦ Advisor: Terence Tao M.A., Mathematics, 2010 California Institute of Technology B.S., Mathematics, 2008
EMPLOYMENT	The University of British Columbia Assistant professor, 2016–present Massachusetts Institute of Technology NSF/pure math instructor, 2013–2016
HONORS AND AWARDS	National Science Foundation Mathematical Sciences Postdoctoral Research Fellowship (NSF MSPRF), 2013–2016 National Defense Science and Engineering Graduate Fellowship (NDSEG), 2010–2013 National Science Foundation Graduate Research Fellowship Program (NSF GRFP). Deferred to accept NDSEG
GRANTS	NSERC discovery, 2017-2021.
TEACHING	The University of British Columbia <i>Lecturer</i> Math 120 differential calculus (honors), W2018 Math 320 real analysis, W2018 Math 341 introduction to discrete mathematics, S2018 Math 120 differential calculus (honors), W2017 Math 320 real analysis, W2017 Math 120 differential calculus (honors), W2016 Massachusetts Institute of Technology <i>Lecturer</i> 18.100B undergraduate real analysis, W2016
STUDENTS	<ul style="list-style-type: none">◦ Daniel Di Benedetto (joint), 2017–present◦ Jacob Denson (joint), 2017–present
POSTDOCS	<ul style="list-style-type: none">◦ Itay Londner (joint), 2018–present◦ Orit Raz (joint), 2017–present

PUBLICATIONS AND
PREPRINTS

- Counting higher order tangencies for plane curves. Submitted.
- Constructive polynomial partitioning for algebraic curves in \mathbb{R}^3 with applications (with B. Aronov and E. Ezra). Submitted.
- On the discretized sum-product problem (with L. Guth and N.H. Katz). Submitted.
- A discretized Severi-type theorem with applications to harmonic analysis. *Geom. Funct. Anal.*, 28(4):1131–1181, 2018.
- Breaking the 3/2 barrier for unit distances in three dimensions. *Int. Math. Res. Not.*, rnx336, 2017.
- An improved bound on the Hausdorff dimension of Besicovitch sets in \mathbb{R}^3 (with N.H. Katz). In press, *J. Amer. Math. Soc.* 2017.
- Polynomial Wolff axioms and Kakeya-type estimates in \mathbb{R}^4 (with L. Guth). *Proc. London Math. Soc.* 117(1): 192–220, 2018.
- Cutting algebraic curves into pseudo-segments and applications (with M. Sharir). *J. Comb. Theory Ser. A* 150:1–35, 2017.
- Curves in \mathbb{R}^4 and two-rich points (with L. Guth). *Disc. Comput. Geom* 58(1): 232–253, 2017.
- New bounds on curve tangencies and orthogonalities (with J. Ellenberg and J. Solymosi). *Discrete Analysis* 18, 2016.
- Spectral gaps, additive energy, and a fractal uncertainty principle (with S. Dyatlov). *Geom. Funct. Anal.* 26(4):1011–1094, 2016.
- Algebraic curves, rich points, and doubly-ruled surfaces (with L. Guth). To appear in *Am. J. Math.*, 140(5), 2018.
- A note on rich lines in truly high dimensional sets. *FoM, Sigma* 4(e2):1–13, 2016.
- Point-curve incidences in the complex plane (with A. Sheffer and E. Szabó). *Combinatorica* 38(2): 487–499, 2018.
- A semi-algebraic version of Zarankiewicz’s problem (with J. Fox, J. Pach, A. Sheffer, and A. Suk). *J. Eur. Math. Soc.* 19(6): 1785–1810, 2017.
- Few distinct distances implies no heavy lines or circles (with A. Sheffer and F. de Zeeuw). *Combinatorica* 36(3):349–364, 2016.
- Quantitative visibility estimates for unrectifiable sets in the plane (with M. Bond and I. Laba). *Trans. Amer. Math. Soc.* 368:5475–5513, 2016.
- Incidences between points and non-coplanar circles (with A. Sheffer and M. Sharir). *Combin. Probab. Comput.* 24(3):490–520, 2015.
- A Szemerédi-Trotter type theorem in \mathbb{R}^4 . *Disc. Comput. Geom* 54(3):513–572, 2015.
- On the Wolff circular maximal function. *Illinois J. Math.* 56(4):1281–1295, 2014.
- An improved bound on the number of point-surface incidences in three dimensions. *Contrib. Discrete Math.* 8(1):100–121, 2013.
- L^3 estimates for an algebraic variable coefficient Wolff circular maximal function. *Revista Mat. Iber.* 28(4):1061–1090, 2012.
- On universal cycles for multisets. (with G. Hurlbert and T. Johnson). *Discrete Math.* 309(17):5321–5327, 2009.
- Bounds on degrees of p -adic separating polynomials. (with D.J. Katz). *J. Comb. Theory Ser. A* 115(7):1310–1319, 2008.

RECENT TALKS

- Geometric Measure Theory and its Connections, Helsinki FI, June 2018.
- Additive Combinatorics from a Geometric Viewpoint. USC, Columbia, SC. May 2018.
- Combinatorics Seminar. UCSD, San Diego CA, May 2018.
- Mini Real Algebraic Geometry Conference, Purdue, West Lafayette IN, April 2018.
- Colloquium, April 19-21, 2018. Indiana University, Bloomington IN, April 2018.
- Extremal Problems in Combinatorial Geometry, Banff international research station, Banff BC, February 2018.
- Algebraic Methods in Combinatorics, Center of mathematical sciences and applications, Harvard MA, November 2017.
- Harmonic Analysis and Related Areas, Clay mathematics institute, Oxford UK, September 2017.
- Real Analysis, Harmonic Analysis, and Applications workshop, Oberwolfach DE, July 2017.
- Harmonic analysis and its interactions: in honour of Tony Carbery. ICMS, Edinburgh UK,

July 2017.

- Recent Developments in Harmonic Analysis, MSRI CA, May 2017.
- Discrete Geometry workshop, workshop, Oberwolfach, April 2017.
- IPAM reunion conference: Algebraic techniques for combinatorial and computational geometry, Lake Arrowhead CA. December 2016.
- Colloquium, Western Washington University, Bellingham WA, Nov 2016.
- Atlanta Lecture Series in Combinatorics and Graph Theory, Emory University, Oct 2016.
- Analysis seminar, Caltech, Pasadena CA. June 2016.
- IPAM reunion conference: Algebraic techniques for combinatorial and computational geometry, Lake Arrowhead CA. December 2015
- Combinatorics seminar, UIC. November 2015.
- Analysis seminar, Brown University. November 2015.
- Analysis seminar, UCLA. November 2015.
- Combinatorics seminar, Georgia Tech. March 2015.
- Plenary speaker, South East analysis seminar, Athena, GA. March 2015.
- Combinatorics seminar, University of Rochester. February 2015.
- Combinatorics seminar, Caltech. February 2015.

PROFESSIONAL
SERVICE

Primary organizer, MSRI Summer Graduate School on The Polynomial Method. July 8-19, 2019, Berkeley CA.

Member of NDSEG panel 2014.

Referee for Adv. Math.; Am. J. Math.; BLMS; Contrib. Discrete Math.; CPC; Discr. Anal.; DCG; Discr. Math.; ESA; Eurocomb; FFA; FoCS; GAFA; IMRN; Involve; Israel J. Math.; JEMS; JCTA; Proc. AMS; Proc. Cam. Phil. Soc.; Proc. LMS; SIDMA; SoCG.

LAST UPDATED

August 28, 2018.