Brandon Hanson

Department of Mathematics
University of Georgia
Athens, GA 30602

Phone: (416) 899-3209
Office: 624 Boyd
Email: brandon.w.hanson@gmail.com
Web: `www.brandonhanson.ca`

Citizenship

Canadian

Education

Ph.D. Mathematics. University of Toronto (under Prof. J. B. Friedlander), 2015. Thesis: *Character sum estimates in finite fields and applications.*

M.Sc. Mathematics. University of Toronto, 2010.

B.Math. Computer Mathematics, *Highest Honours.* Carleton University, 2009.

Positions

Limited Term Assistant Professor. The University of Georgia, 2018-present.

Chowla Research Fellow. The Pennsylvania State University, 2015-2018.

Visitor - Long program 'Thematic Program on Unlikely Intersections, Heights, and Efficient Congruencing". Fields Institute, January-April 2017.

Research member - Long program "Algebraic Techniques for Combinatorial and Computational Geometry". Institute for Pure and Applied Mathematics at UCLA, March-June 2014.

Research

Fields of Research Interest

Number theory, combinatorics, harmonic analysis.

Honors, Awards, & Fellowships

NSF Grant 2001622 - *Arithmetic structure and distribution.* $95,398, 2020-2023.

AMS-Simons Travel Grant. $4000, 2018-2019.

University of Toronto:

    University of Toronto Fellowship. 2009.

    NSERC CGS M. 2010.

    Ontario Graduate Scholarship. 2011.

    NSERC CGS D. 2012-2014.

    Malcolm Slingsby Robertson Prize in Mathematics for Excellence in Thesis Research. 2015.

Carleton University:

    Dean's List. 2005 - 2009.

Entrance Scholarship. 2005 - 2009.

Richard J Semple Award. 2007 - 2009.

University Medal in Mathematics. 2009.

Publications

1. B. Hanson, O. Roche-Newton and M. Rudnev, *Higher convexity and iterated sumsets*. Submitted.

2. B. Hanson, *Littlewood's problem for sets of integers with multidimensional structure*. To appear in IMRN.

3. B. Hanson and G. Petridis, *Refined Estimates Concerning Sumsets Contained in the Roots of Unity*. To appear in Proc. of the London Math. Soc.

4. B. Hanson, *Long regularly-spaced and convex sequences in dense sets of integers*. Submitted.

5. B. Hanson, O. Roche-Newton and D. Zhelezov, *On iterated product sets with shifts II*. To appear in Algebra and Number Theory.

6. B. Hanson, O. Roche-Newton and D. Zhelezov, *On iterated product sets with shifts*. Mathematika 65 (2019), no. 4, 831-850.

7. B. Hanson, *Additive Correlation and the Inverse Problem for the Large Sieve*. Mathematical Proceedings of the Cambridge Philosophical Society, 2018.

8. B. Hanson and A. Zaman *The density of numbers represented by diagonal forms of large degree*. Mathematika 64 (2018), no. 2, 542-550.

9. B. Hanson and R.C. Vaughan *Density of Positive Diagonal Binary Quadratic Forms*. To appear in Acta Arith.

10. B. Hanson, *The Additive Structure of Cartesian Products Spanning Few Distinct Distances*. Combinatorica 38 (2018), no. 5, 1095-1100.

11. B. Hanson, R.C. Vaughan and R. Zhang, *The least number with prescribed Legendre symbols and representation by binary quadratic forms of small discriminant*. J. Number Theory 179 (2017), 3-16.

12. B. Hanson, *Estimates for character sums with various convolutions*. Acta Arith. 179 (2017), no. 2, 133-146.

13. B. Hanson, B. Lund and O. Roche-Newton, *On distinct perpendicular bisectors and pinned distances in finite fields*. Finite Fields Appl. 37 (2016), 240-264.

14. B. Hanson. *Character sums over Bohr sets*. Canad. Math. Bull. 58 (2015), no. 4, 774-786.

15. B. Hanson. *Capturing forms in dense subsets of finite fields*. Acta Arith. 160 (2013), 277-284.

16. B. Hanson, D. Panario and D. Thomson. *Swan-like results for binomials and trinomials over finite fields of odd characteristic*. Designs, Codes and Cryptography, 61(3) (2011), 273-283.

Teaching

Instructor, University of Georgia

Calculus I.

Instructor, Pennsylvania State University World Campus

Techniques of calculus.

Instructor, Pennsylvania State University

> Calculus II, Calculus III, Introduction to real analysis.

Teaching Assistant, University of Toronto

> Linear and abstract algebra, calculus and ordinary differential equations, real and complex analysis, number theory, combinatorics.

Seminar and Conference Talks

Regular and convex subsequences in dense sets of integers.

> Second Vietnam Workshop on Graph Theory and Discrete Geometry, January 2019.

Multiplicatively structured sets, shifted.

> AIM program on Additive Combinatorics, August 2018.

> UGA Number Theory Seminar, September 2018.

Additive correlation and the inverse problem for the large sieve.

> MIT Combinatorics Seminar, December 2017.

> Penn State Algebra and Number Theory Seminar, September 2017.

The density of integers not represented by diagonal forms of large degree.

> Combinatorial and Additive Number Theory (CANT), May 2017.

> Towson University, May 2017.

Representation by binary quadratic Forms in short intervals.

> Fields Institute, February 2017.

Sums of squares and combinatorial geometry

> Conference on Analytic Number Theory, Oberwolfach, November 2016.

Interactions between combinatorial geometry and additive combinatorics

> Penn State Algebra and Number Theory Seminar, September 2016.

> UGA Combinatorics Seminar, September 2016.

The additive structure of squares.

> Rochester Combinatorics Seminar, April 2016.

Character sums with various convolutions.

> UGA Number Theory Seminar, April 2015.

> Georgia Tech Combinatorics Seminar, April 2015.

> PSU Number Theory Seminar, March 2015.

> Winter Meeting of the Canadian Mathematical Society, Section Harmonic Analysis and Diophantine Equations, December 2015.

> IPAM Reunion Conference, December 2015.

Character sums on Bohr sets - IPAM Algebraic Techniques for Combinatorial and Computational Geometry, Seminar series, June 2014.

Multiplicative character sums and the Littlewood problem - IPAM Algebraic Techniques for Combinatorial and Computational Geometry, Culminating workshop, June 2014.

Capturing forms in dense subsets of finite fields - Number Theory Satellite Session, Winter meeting of the CMS, Dec. 2012.

Miscellaneous

Spoken Languages: English, French.

Programming Languages: C, C++, Java, PHP, JavaScript, Sage.