

Yu-Ru Liu
Curriculum Vitae

Department of Pure Mathematics
University of Waterloo
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Fields of Research

Analytic Number Theory, Number Theory in Function Fields, The Circle Method, Sieve Methods

Education

- Ph.D. Mathematics, Harvard University, 2003
Dissertation: *Generalizations of the Turán and the Erdős-Kac Theorems*
Supervisor: Barry C. Mazur
- M.S. Mathematics, Queen's University, 1998
Dissertation: *The Turán Sieve and Some of its Applications*
Supervisor: M. Ram Murty
- B.A. Mathematics, McGill University, 1998

Employment History

- 2013–present Professor, Department of Pure Mathematics, University of Waterloo
- 2008–2013 Associate Professor, Department of Pure Mathematics, University of Waterloo
- Winter 2007 Visiting Scholar, Department of Mathematics, University of Michigan
- Winter 2005 Visiting Scholar, Department of Mathematics, University of Michigan
- 2003–2008 Assistant Professor, Department of Pure Mathematics, University of Waterloo

Honours and Awards

- 2023 Colloquium Speaker, PIMS-Lethbridge Distinguished Lecture Series, University of Lethbridge
- 2021 Key Speaker, Hausdorff School: The Circle Method, Hausdorff Center for Mathematics
- 2021 Colloquium Speaker, Women Lecture Series for AWM's 50th Anniversary, Kansas States University
- 2013 Distinction in Teaching Award, Faculty of Mathematics, University of Waterloo
- 2012 Outstanding Performance Award, University of Waterloo
- 2011 Instructor of the Year, Mathematical Society at the University of Waterloo
- 2005 G. de B. Robinson Award, Canadian Mathematical Society
- 2003–2008 University Faculty Award, Natural Sciences and Engineering Research Council
- 2002 Certificate of Distinction in Teaching, Harvard University
- 2001 Certificate of Distinction in Teaching, Harvard University

Research Grants

- 2016–2022 NSERC Individual Discovery Grant
- 2011–2016 NSERC Individual Discovery Grant
- 2006–2011 NSERC Individual Discovery Grant
- 2003–2006 NSERC Individual Discovery Grant
- 2003–2005 University of Waterloo Start-up Grant

Publication List

- On the number of irreducible factors with a given multiplicity in function fields (with S. Das, E. Elma and W. Kuo), 20 pages, to appear in *Finite Fields Appl.*
- Equidistribution of polynomial sequences in function fields, with applications (with T. H. Lê and T. D. Wooley), 37 pages, submitted.
- Bounds on 10th moments of (x, x^3) for ellipsephic sets (with T. C. Anderson, B. Hu and A. Talmage), to appear in *AMS Contemporary Mathematics*, 11 pages.
- Sieve Methods in Random Graph Theory (with J.C. Sounders), *Graphs and Combin.* 39 (2023), Article number: 39, 23 pages.
- Number of prime factors with a given multiplicity (with E. Elma), *Canad. Math. Bull.*, 65 (2022), 253-269.
- The shifted Turán sieve method on tournaments II (with W. Kuo, S. Ribas and K. Zhou), *Discrete Mathematics*, 344 (2021), Page No. 112602, 11 pages.
- The asymptotic estimates and Hasse principle for multidimensional Waring's problem (with W. Kuo and X. Zhao), *Adv. Math.* 353 (2019), 1-66.
- The shifted Turán sieve method on tournaments (with W. Kuo, S. Ribas and K. Zhou), *Canad. Math. Bull.* 62 (2019), 841-855.
- A. Bhowmick, T. H. Le and Y.-R. Liu, *A note on character sums in finite fields*, *Finite Fields Appl.* 46 (2017), 247-254.
- Y.-R. Liu and C. Spencer, *A prime analogue of Roth's theorem in function fields*, *Advances in the Theory of Number: Proceedings of the CNTA XIII* (2015), 105-148.
- W. Kuo, Y.-R. Liu and X. Zhao, *Multidimensional Vinogradov-type estimates in function fields*, *Canad. J. Math* 66 (2014), 844-873.
- T. H. Le and Y.-R. Liu, *On sets of polynomials whose difference set contain no squares*, *Acta. Arith.* 161 (2013), 127-143.
- Y.-R. Liu and X. Zhao, *A generalization of Roth's theorem in function fields*, *Michigan Math. J.* 61 (2012), 839-866.

- Y.-R. Liu, C. V. Spencer and X. Zhao, *A generalization of Meshulam’s theorem on subsets of finite abelian groups with no 3-term arithmetic progression (II)*, European J. of Combin. 32 (2011), 258-264.
- Y.-R. Liu and T. D. Wooley, *Waring’s problem in function fields*, J. Reine Angew. Math., 638 (2010), 1-67.
- Y.-R. Liu, C. V. Spencer and X. Zhao, *Roth’s theorem on system of linear forms in function fields*, Acta. Arith., 142 (2010), 377-386.
- W. Kuo and Y.-R. Liu, *Gaussian laws on Drinfeld modules*, Int. J. Number Theory 7 (2009), 1179–1203.
- W. Kuo and Y.-R. Liu, *Cyclicity of finite Drinfeld modules*, J. London Math. Soc. 80 (2009), 567-584.
- W. Kuo and Y.-R. Liu, *A Carlitz module analogue of a conjecture of Erdős and Pomerance*, Trans. Amer. Math. Soc. 361 (2009), 4519-4539.
- Y.-R. Liu and C. V. Spencer, *A generalization of Roth’s theorem in function fields*, Int. J. Number Theory 7 (2009), 1149-1154.
- Y.-R. Liu and C. V. Spencer, *A generalization of Meshulam’s theorem on subsets of finite abelian groups with no 3-term arithmetic progression*, Des. Codes Cryptogr. 52 (2009), 83-91.
- W. Kuo and Y.-R. Liu, *The Erdős-Kac theorem and its generalizations*, The anatomy of integers, CRM Proceedings & Lecture Notes 46 (2008), 209-216.
- Y.-R. Liu and T. D. Wooley, *The unrestricted variant of Waring’s problem in function fields*, Funct. Approx. Comment. Math. 37 (2007), 285-292.
- Y.-R. Liu, *Prime analogues of the Erdős-Kac theorem for elliptic curves*, J. Number Theory 119 (2006), 155-170.
- Y.-R. Liu and M. R. Murty, *A weighted Turán sieve method*, J. Number Theory 116 (2006), 1-20.
- Y.-R. Liu, *A prime analogue of Erdős-Pomerance’s conjecture for elliptic curves*, Comment. Math. Helv. 80 (2005), 755-769.
- Y.-R. Liu, *Prime divisors of the number of rational points on elliptic curves with complex multiplication*, Bull. London Math. Soc. 37 (2005), 658-664.
- Y.-R. Liu and M. R. Murty, *Sieve methods in combinatorics*, J. Combin. Theory Ser. A 111 (2005), 1-23.
- Y.-R. Liu, *A generalization of the Erdős-Kac theorem and its applications*, Canad. Math. Bull. 47 (2004), 589-606.

- Y.-R. Liu, *A generalization of the Turán theorem and its applications*, *Canad. Math. Bull.* 47 (2004), 573-588.
- Y.-R. Liu, *The Erdős theorem and the Halberstam theorem in function fields*, *Acta Arith.* 114 (2004), 323-330.
- Y.-R. Liu and M. R. Murty, *The Turán sieve method and some of its applications*, *J. Ramanujan Math. Soc.* 14 (1999), 21-35.

Professional Activities

- Co-organizer, Analytic Number Theory and L -functions Session, CMS Meeting, Memorial University, June 2022
- Mini-course instructor: An Introduction to the Circle Method, Lecture Series (3 online talks), Hausdorff School: the Circle Method, Hausdorff Center for Mathematics, May, 2021.
- Co-organizer, Analytic Number Theory Session, CMS Meeting, University of Toronto, December 2019
- Co-organizer, Analytic Number Theory Session, CMS Meeting, University of Waterloo, December 2017
- Co-instructor, Graduate Mini-Course on Efficient Congruencing, Fields Institute, March 2017
- Co-organizer, Workshop on Efficient Congruencing and Translation-invariant Systems, Fields Institute, March 2017
- Co-organizer, Thematic Program on o -minimality, Heights and Efficient Congruencing, Fields Institute, January-June 2017
- Member, Scientific Committee, CMS Meeting, Montreal, December 2015
- Editor, *Taiwan Journal of Mathematics* 2014-2020
- Local committee member, Two Weeks at Waterloo – a Summer School for Women in Mathematics, University of Waterloo, August 2012
- Co-organizer, Canadian Number Theory Association Meeting X, University of Waterloo, July 2008
- Co-organizer, L -functions and Algebraic Curves Session, CMS Meeting, University of Waterloo, June 2005
- Co-organizer, Workshop in Number Theory and Random Matrix Theory, University of Waterloo, June 2005
- Lifetime member of Canadian Mathematics Society

Supervision (* indicates co-supervision and \diamond indicates tenured or tenure-track positions)

PDF	Zhenchao Ge* (in progress) Alan Talmage* \diamond 2023 Julia Brandes* \diamond 2017 Thai Hoang Le \diamond 2011, 2013, 2015 Craig Spencer \diamond 2008
Ph.D.	Jérémy Champagne (in progress) Sourabhashis Das* (in progress) Owen Sharpe (in progress) Yash Totani* (in progress) Ertan Elma* 2020 John Sanders* \diamond 2018 Savio Ribas \diamond 2017 (exchang student) Shuntaro Yamagishi 2015 Xiaomei Zhao \diamond 2010
M.Math	Yen-Kang Fu (in progress) Ismael El Yassini 2023 Zishen Qu* 2022 Owen Sharpe 2022 John Dykes 2018 Shuming Jia 2016 Cassie Naymie* 2012 Yui Nishizawa 2011 Leo Kwong 2010 Patrice Camire* 2008 Lalit Jain* 2008 Sourev Sen Gupta* 2008 Li Li 2007
Undergraduate	Jason Hou 2023 Kareem Alfarra 2023 Logan Batson 2023 Aahan Chatterjee 2023 (two terms) Thomas Plamondon 2023 James Houle 2022 Yen-Kang Fu 2022 Evan Girardin 2022 Maya Gusak 2022 Jacob Mausberg 2022 Zikang Lei 2021 Tuan Hiep Do 2021 Josué Kurke 2021 Andrew Luo 2021

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Undergraduate Josué Kurke 2020
Wanxin Li 2020
Jeffrey Tse 2020
Chin Ho Cheung* 2019 (exchange student)
Noah Rathjen* 2019
Yixin Chen 2018
Trevor Clokie 2018
Saiyue Lyn 2018
Zhenyuan Zhang 2018
Shouzhen Gu* 2017
Akshay Tiwary 2017
Ian Waudby-Smith 2017
Stephen Wen* 2017
Daniel Chen 2016
Arnaud Marek 2016 (exchange student)
David Spivak 2016
Kevin Kai Qi Zhao* 2015
Chao Hsian Lin 2013
Liyu Wang 2013 (two terms) ll
Alexander Mangerel 2011, 2012
Peter Sinclair* 2011
Cassie Naymie 2010
Yui Nishizawa* 2010
Krishna Sivaranjan* 2010
Cyril Becker 2009, 2010 (exchange student)
Brad Hannigan-Daley* 2008
Jennifer Park* 2008
Pei Pei* 2008
David Rhee* 2008
Michael Lipnowski* 2007, 2008
Lloyd Elliot* 2007
Daniel Rowe* 2007
Michael Sgambelluri* 2007
Lalit Jain* 2006 (two terms)
Xiannan Li 2006
Adam Felix 2005, 2006
Eugene Eisenstein 2005

Teaching Experience

PMATH 944	Topics in Number Theory: Analytic Methods for Diophantine Problems (F13, F16)
PMATH 940	Topics in Number Theory: Analytic Methods for Diophantine Problems (W23)
PMATH 744	Topics in Number Theory: the Circle Method (F05)
PMATH 740/440	Analytic Number Theory (F15, F17; F23)
PMATH 642/442	Fields and Galois Theory (F04, F06, F07, F09)
PMATH 499	Elliptic Curves and Modular Forms (W08)
PMATH 499	Number Theory in Function Fields (S07)
PMATH 499	Sieve Methods (W10)
PMATH 348	Fields and Galois Theory (W16, W18, W20, W21, W22)
MATH 347	Groups and Rings (F16, S18, F22; F23)
MATH 145	Advanced Algebra (F07)
MATH 138	Calculus II (W08, W10, W14)
MATH 137	Calculus I (F06, S18)
MATH 135	Algebra (F03, F04, F05, F09, F10, W11, F15, W16, F16, F17, F19, F20, F21, F22)