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

2023–present	Director, Women in Mathematics, University of Waterloo
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 (NSERC)
2002	Certificate of Distinction in Teaching, Harvard University
2001	Certificate of Distinction in Teaching, Harvard University

Research Grants

2024–2029	NSERC Individual Discovery Grant
2016–2023	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

Publications

1. S. Das, W, Kuo and Y.-R. Liu, *Distribution of $\omega(n)$ over h-free and h-full numbers*, accepted by International Journal of Number Theory, 23 pages.

2. W. Kuo, Y.-R. Liu and Y. Totani, *A function field analogue of Jacob's theorem on sums of squares and its moments*, accepted by Canad. Math. Bull., 15 pages.

3. S. Das, W. Kuo and Y.-R. Liu, *On the number of irreducible factors with a given multiplicity over h-free and h-full numbers*, J. of Number Theory, 267 (2025), 176-201.

4. T. C. Anderson, B. Hu, Y.-R. Liu and A. Talmage, *Bounds on 10th moments of (x, x^3) for ellipsephic sets* AMS Contemporary Mathematics, 792 (2024), 125-132.

5. S. Das, E. Elma, W. Kuo and Y.-R. Liu, *On the number of irreducible factors with a given multiplicity in function fields*, Finite Fields Appl. 92 (2023), Page No. 102281, 22 pages.

6. J. C. Sounders and Y.-R. Liu, *Sieve Methods in Random Graph Theory*, Graphs and Combinatorics 39 (2023), Article number: 39, 22 pages.

7. E. Elma and Y.-R. Liu, *Number of prime factors with a given multiplicity*, Canad. Math. Bull., 65 (2022), 253-269.

8. W. Kuo, Y.-R. Liu, S. Ribas and K. Zhou, *The shifted Turán sieve method on tournaments II*, Discrete Mathematics, 344 (2021), Page No. 112602, 11 pages.

9. W. Kuo, Y.-R. Liu and X. Zhao, *The asymptotic estimates and Hasse principle for multidimensional Warings problem*, Adv. Math. 353 (2019), 1-66.

10. W. Kuo, Y.-R. Liu, S. Ribas and K. Zhou, *The shifted Turán sieve method on tournaments*, Canad. Math. Bull. 62 (2019), 841-855.

11. A. Bhowmick, T. H. Lê and Y.-R. Liu, *A note on character sums in finite fields*, Finite Fields Appl. 46 (2017), 247-254.

12. 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.

13. W. Kuo, Y.-R. Liu and X. Zhao, *Multidimensional Vinogradov-type estimates in function fields*, Canad. J. Math 66 (2014), 844-873.

14. T. H. Lê and Y.-R. Liu, *On sets of polynomials whose difference set contain no squares*, Acta. Arith. 161 (2013), 127-143.

15. Y.-R. Liu and X. Zhao, *A generalization of Roth's theorem in function fields*, Michigan Math. J. 61 (2012), 839-866.

16. 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.

17. Y.-R. Liu and T. D. Wooley, *Waring's problem in function fields*, J. Reine Angew. Math., 638 (2010), 1-67.

18. 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.

19. W. Kuo and Y.-R. Liu, *Gaussian laws on Drinfeld modules*, Int. J. Number Theory 7 (2009), 1179–1203.

20. W. Kuo and Y.-R. Liu, *Cyclicity of finite Drinfeld modules*, J. London Math. Soc. 80 (2009), 567-584.

21. 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.

22. Y.-R. Liu and C. V. Spencer, *A generalization of Roth's theorem in function fields*, Int. J. Number Theory 7 (2009), 1149-1154.

23. 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.

24. 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.

25. 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.

26. Y.-R. Liu, *Prime analogues of the Erdős-Kac theorem for elliptic curves*, J. Number Theory 119 (2006), 155-170.

27. Y.-R. Liu and M. R. Murty, *A weighted Turán sieve method*, J. Number Theory 116 (2006), 1-20.

28. Y.-R. Liu, *A prime analogue of Erdős-Pomerance's conjecture for elliptic curves*, Comment. Math. Helv. 80 (2005), 755-769.

29. 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.

30. Y.-R. Liu and M. R. Murty, *Sieve methods in combinatorics*, J. Combin. Theory Ser. A 111 (2005), 1-23.

31. Y.-R. Liu, *A generalization of the Erdős-Kac theorem and its applications*, Canad. Math. Bull. 47 (2004), 589-606.

32. Y.-R. Liu, *A generalization of the Turán theorem and its applications*, Canad. Math. Bull. 47 (2004), 573-588.

33. Y.-R. Liu, *The Erdős theorem and the Halberstam theorem in function fields*, Acta Arith. 114 (2004), 323-330.

34. 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

Conference Organization

– Faculty representative, Inaugural Ontario Graduate Math Conference, University of Waterloo, June 2024

– Co-organizer, Analytic Number Theory and L-functions Session, CMS Meeting, Memorial University, June 2022

– 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-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

– 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

Editorial Boards

– Editor, Women in Numbers 6 Proceedings, 2023-2024

– Editor, Taiwan Journal of Mathematics 2014-2020

Other Services

– Mini-course instrutor: An Introduction to the Circle Method, Lecture Series (3 talks), National Center for Theoretical Science, Taiwan, July 2023

– Mini-course instrutor: An Introduction to the Circle Method, Lecture Series (3 online talks), Hausdorff School: the Circle Method, Hausdorff Center for Mathematics, May, 2021

– Co-instructor, Graduate Mini-Course on Efficient Congruencing, Fields Institute, March 2017

– Member, Scientific Committee, CMS Meeting, Montreal, December 2015

– Lifetime member of Canadian Mathematics Society

– Regular contributor to Math. Reviews

– Referee of various mathematical journals

Supervision

PDF   Zhenchao Ge (in progress)
            Alan Talmage 2023
            Current position: tenure-track Assistant Professor, Southeast Missouri State University
            Julia Brandes 2017
            Current position: tenured Senior Lecturer, Chalmers/University of Gothenburg
            Thai Hoang Lê 2011, 2013, 2015
            Current position: tenured Associate Professor, University of Mississippi
            Craig Spencer 2008
            Current position: tenured Professor, Kansas State University

Ph.D.   Owen Sharpe (in progress)
            Jérémy Champagne (in progress)
            Sourabhashis Das (in progress)
            Yash Totani (in progress)
            Ertan Elma 2020
            Current position: Postdoc, Lethbridge University
            John Sanders 2018
            Current position: tenured Assistant Professor, Middle Tennessee State University
            Savio Ribas 2017 (exchang student)
            Current position: tenured Associate Professor, Universidade Federal de Ouro Preto
            Shuntaro Yamagishi 2015
            Current position: postdoctoral researcher, Institute of Science and Technology Austria
            Xiaomei Zhao 2010
            Current position: tenured Associate Professor, Central China University

M.Math	Aiden Boyle (in progress)
	Adam Jelinsky (in progress)
	Thomas Plamondon (in progress)
	Yen-Kang Fu 2024
	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 Fan 2024
	Grace He 2024
	Peiran Tao 2024
	Michael Xu 2024
	Aiden Boyle 2024
	Adam Jelinsky 2024
	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
	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

Undergraduate	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)
	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, W24, W25)
MATH 347	Groups and Rings (F16, S18, F22; F23, F24)
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)