A. BIOGRAPHICAL INFORMATION

1. Personal

Aleksandar Nikolov
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2. Degrees

PhD: 2014 in Computer Science, from Rutgers, the State University of New Jersey, USA
Thesis: New Computational Aspects of Discrepancy Theory
Advisor: S. Muthukrishnan

BSc: 2008 in Computer Science, from Saint Peter's College, New Jersey, USA
Thesis: Privacy-Enhancing Higher-Order Itemset Mining
Advisor: Marcia Mitchell

3. Employment

July 2021–Present: University of Toronto, Department of Computer Science
Associate Professor

July 2015–Jult 2021: University of Toronto, Department of Computer Science
Assistant Professor

Sept 2020–Present: Schwartz Reisman Institute for Technology and Society
Faculty Affiliate

Nov 2020–June 2021: Schwartz Reisman Institute for Technology and Society
Faculty Fellow

June 2018–Present: Vector Institute
Faculty Affiliate

Oct 2014–July 2015: Microsoft Research, Redmond
Postdoctoral Researcher
Supervisor: Christopher Meek

Sept 2012–Oct 2014: Rutgers, the State University of New Jersey
Simons Graduate Fellow
Supervisor: S. Muthukrishnan

Aug 2008–Sept 2012 Rutgers, the State University of New Jersey
Graduate Assistant
Supervisor: S. Muthukrishnan

4. **Honours**

2018–2023 Ontario Early Researcher Award
2016–2027 Canada Research Chair in Algorithms and Private Data Analysis
2015 Symposium on Computational Geometry Best Paper Award
2012–2014 Simons Graduate Fellow
2008 Valedictorian, St. Peter's College

5. **Professional Affiliations and Activities**

Fall 2019–Present: Steering Committee Member for the Theory and Practice of Differential Privacy Workshop
Fall 2021: Guest Editor of STOC 2021 Special Issue of SIAM Journal on Computing
Winter 2019: Guest Editor of the TPDP 2018 Special Issue of the Journal of Privacy and Confidentiality
Winter 2019: Visiting Researcher in the Simons Institute for Theoretical Computer Science, UC Berkeley
August 2018: Visiting Researcher in the Bernoulli Center in Ecole Polytechnique Federale de Lausanne
Fall 2017: Visiting Researcher in the Simons Institute for Theoretical Computer Science, UC Berkeley
Winter 2016: Guest Editor of SODA 2016 Special Issue of ACM Transactions on Algorithms

B. ACADEMIC HISTORY

6. A. **Research Endeavours**

Computational Discrepancy Theory: Research in the computational aspects of combinatorial discrepancy theory, and its applications to private data analysis, combinatorial optimization, computational geometry, and numerical integration.

Private Data Analysis: Design of differentially private algorithms for statistics and machine learning with strong and rigorous optimality guarantees. Research into the limitations of private data analysis.

Optimal Design of Experiments: Design of efficient algorithms for discrete optimal design of experiments under combinatorial constraints.

Nearest Neighbour Search: Design of efficient data structures for approximate near neighbour search in high-dimensional spaces.

B. **Research Awards** during preceding 5 years

2021 Schwartz Reisman Institute Faculty Fellowship
Granted by: Schwartz Reisman Institute for Technology and Society
Total amount: $25,000

2021–2027 Discovery Grant Accelerator Supplement
Granted by: Natural Science and Engineering Research Council
Total amount: $120,000

2021–2027 Discovery Grant
Granted by: Natural Science and Engineering Research Council
Total amount: $320,000

2021-2027 Canada Research Chair
Granted by: Natural Science and Engineering Research
Total amount: $500,000

2018–2023 Early Researcher Award
Granted by: Ontario Ministry of Research and Innovation
Total amount: $100,000

2017–2019 Connaught Grant
Granted by: Connaught Fund
Total amount: $10,000

2016–2021 Discovery Grant
Granted by: Natural Science and Engineering Research Council
Total amount: $180,000

2016–2021 Canada Research Chair
Granted by: Natural Science and Engineering Research
Total amount: $500,000

C. **Patents** awarded during past 5 years
US9672364B2 *Differentially Private Linear Queries on Histograms*
with Kunal Talwar and Li Zhang

C. SCHOLARLY AND PROFESSIONAL WORK

7. Refereed Publications

All publications list co-authors in alphabetical order. Names marked with * are students who worked under Nikolov's supervision at the time of publication.

A. Articles

1. Andoni, A., A. Nikolov, I. P. Razenshteyn, and E. Waingarten (2021). Approximate Nearest Neighbors Beyond Space Partitions. In: *Proceedings of the 2021 ACM-SIAM Symposium on Discrete Algorithms, SODA 2021, Virtual Conference, January 10 - 13, 2021*. SIAM, pp.1171–1190.
2. Kush, D., A. Nikolov, and H. Tang (2021). Near Neighbor Search via Efficient Average Distortion Embeddings. In: *37th International Symposium on Computational Geometry (SoCG 2021)*. Vol. 189. Leibniz International Proceedings in Informatics (LIPIcs). Schloss Dagstuhl – Leibniz-Zentrum für Informatik, pp.50:1–50:14. **Invited to Special Journal Issue**.
3. Abbasi Zadeh*, S., N. Bansal, G. Guruganesh, A. Nikolov, R. Schwartz, and M. Singh (2020). Sticky Brownian Rounding and its Applications to Constraint Satisfaction Problems. In: *Proceedings of the Thirty-First Annual ACM-SIAM Symposium on Discrete Algorithms. SODA 2020*. SIAM, pp.854–873. **Invited to Special Journal Issue**.
4. Bassily, R., A. Cheu, S. Moran, A. Nikolov, J. R. Ullman, and S. Z. Wu (2020). Private Query Release Assisted by Public Data. In: *Proceedings of the 37th International Conference on Machine Learning, ICML 2020, 13-18 July 2020, Virtual Event*. Vol. 119. Proceedings of Machine Learning Research. PMLR, pp.695–703.
5. Edmonds*, A., A. Nikolov, and J. Ullman (2020). The Power of Factorization Mechanisms in Local and Central Differential Privacy. In: *STOC'20—Proceedings of the 52n Annual ACM SIGACT Symposium on Theory of Computing*. ACM, pp.425–438.
6. Gopi, S., G. Kamath, J. Kulkarni, A. Nikolov, Z. S. Wu, and H. Zhang (2020). Locally Private Hypothesis Selection. In: *Conference on Learning Theory, COLT 2020*. Vol. 125. Proceedings of Machine Learning Research. PMLR, pp.1785–1816.
7. Khesin*, A. B., A. Nikolov, and D. Paramonov* (2020). Preconditioning for the geometric transportation problem. *Journal of Computational Geometry* 11(2), 234–259. Originally in SoCG 2019.
8. Li*, L. and A. Nikolov (2020). On the Computational Complexity of Linear Discrepancy. In: *28th Annual European Symposium on Algorithms (ESA 2020)*. Vol. 173. Leibniz International Proceedings in Informatics (LIPIcs). Schloss Dagstuhl–Leibniz-Zentrum für Informatik, pp.69:1–69:16.
9. Madan, V., A. Nikolov, M. Singh, and U. Tantipongpipat (2020). Maximizing Determinants under Matroid Constraints. In: *61st IEEE Annual Symposium on Foundations of Computer Science, FOCS 2020, Durham, NC, USA, November 16-19, 2020*. IEEE, pp.565–576.
10. Matoušek, J., A. Nikolov, and K. Talwar (2020). Factorization norms and hereditary discrepancy. *Int. Math. Res. Not. IMRN* (3), 751–780. Originally in SODA 2015 and SoCG 2015.
11. Błasiok, J., M. Bun, A. Nikolov, and T. Steinke (2019). Towards instance-optimal private query release. In: *Proceedings of the Thirtieth Annual ACM-SIAM Symposium on Discrete Algorithms. SODA 2019*. SIAM, Philadelphia, PA, pp.2480–2497.
12. Dadush, D., S. Garg, S. Lovett, and A. Nikolov (2019). Towards a Constructive Version of Banaszczyk's Vector Balancing Theorem. *Theory of Computing* 15(15), 1–58. Originally in APPROX-RANDOM 2016.
13. Khesin*, A. B., A. Nikolov, and D. Paramonov* (2019). Preconditioning for the geometric transportation problem. In: *35th International Symposium on Computational Geometry. SoCG 2019*. Vol. 129. LIPIcs. Leibniz Int. Proc. Inform. Schloss Dagstuhl. Leibniz-Zent. Inform., Wadern, pp.Art. No. 15, 14. **Invited to Special Journal Issue**.

14. Li, J., A. Nikolov, I. P. Razenshteyn, and E. Waingarten (2019). On Mean Estimation for General Norms with Statistical Queries. In: *Conference on Learning Theory, COLT 2019*. Vol. 99. Proceedings of Machine Learning Research. PMLR, pp.2158–2172.
15. Nikolov, A., M. Singh, and U. T. Tantipongpipat (2019). Proportional volume sampling and approximation algorithms for A-optimal design. In: *Proceedings of the Thirtieth Annual ACM-SIAM Symposium on Discrete Algorithms. SODA 2019*. SIAM, Philadelphia, PA, pp.1369–1386.
16. Aistleitner, C., D. Bilyk, and A. Nikolov (2018). Tusnády's problem, the transference principle, and non-uniform QMC sampling. In: *Monte Carlo and quasi–Monte Carlo methods*. Vol. 241. Springer Proc. Math. Stat. Springer, Cham, pp.169–180.
17. Andoni, A., A. Naor, A. Nikolov, I. Razenshteyn, and E. Waingarten (2018a). Data-dependent hashing via nonlinear spectral gaps. In: *STOC'18—Proceedings of the 50th Annual ACM SIGACT Symposium on Theory of Computing*. ACM, New York, pp.787–800.
18. Andoni, A., A. Naor, A. Nikolov, I. Razenshteyn, and E. Waingarten (2018b). Hölder homeomorphisms and approximate nearest neighbors. In: *59th Annual IEEE Symposium on Foundations of Computer Science—FOCS 2018*. IEEE Computer Soc., Los Alamitos, CA, pp.159–169.
19. Dadush, D., A. Nikolov, K. Talwar, and N. Tomczak-Jaegermann (2018). Balancing vectors in any norm. In: *59th Annual IEEE Symposium on Foundations of Computer Science—FOCS 2018*. IEEE Computer Soc., Los Alamitos, CA, pp.1–10.
20. Andoni, A., H. L. Nguyen, A. Nikolov, I. Razenshteyn, and E. Waingarten (2017). Approximate near neighbors for general symmetric norms. In: *STOC'17—Proceedings of the 49th Annual ACM SIGACT Symposium on Theory of Computing*. ACM, New York, pp.902–913.
21. Kattis*, A. and A. Nikolov (2017). Lower bounds for differential privacy from Gaussian width. In: *33rd International Symposium on Computational Geometry. SoCG 2017*. Vol. 77. LIPIcs. Leibniz Int. Proc. Inform. Schloss Dagstuhl. Leibniz-Zent. Inform., Wadern, pp.Art. No. 45, 16.
22. Nikolov, A. (2017). Tighter Bounds for the Discrepancy of Boxes and Polytopes. *Mathematika* 63(3), 1091–1113.
23. Dadush, D., S. Garg, S. Lovett, and A. Nikolov (2016). Towards a constructive version of Banaszczyk's vector balancing theorem. In: *Approximation, randomization, and combinatorial optimization. Algorithms and techniques. APPROX/RANDOM 2016*. Vol. 60. LIPIcs. Leibniz Int. Proc. Inform. Schloss Dagstuhl. Leibniz-Zent. Inform., Wadern, pp.Art. No. 28, 12. **Invited to Special Journal Issue**.
24. Nikolov, A. and M. Singh (2016). Maximizing determinants under partition constraints. In: *STOC'16—Proceedings of the 48th Annual ACM SIGACT Symposium on Theory of Computing*. ACM, New York, pp.192–201.
25. Nikolov, A., K. Talwar, and L. Zhang (2016). The geometry of differential privacy: the small database and approximate cases. *SIAM J. Comput.* 45(2), 575–616.
26. Dwork, C., A. Nikolov, and K. Talwar (2015). Efficient Algorithms for Privately Releasing Marginals via Convex Relaxations. *Discrete Comput. Geom.* 53(3), 650–673. Originally in SoCG 2014.
27. Matoušek, J. and A. Nikolov (2015). Combinatorial discrepancy for boxes via the γ_2 norm. In: *31st International Symposium on Computational Geometry. SoCG 2015*. Vol. 34. LIPIcs. Leibniz Int. Proc. Inform. Schloss Dagstuhl. Leibniz-Zent. Inform., Wadern, pp.1–15.
28. Nikolov, A. (2015a). An improved private mechanism for small databases. In: *Automata, languages, and programming. Part I*. Vol. 9134. Lecture Notes in Comput. Sci. Springer, Heidelberg, pp.1010–1021.
29. Nikolov, A. (2015b). Randomized rounding for the largest simplex problem [extended abstract]. In: *STOC'15—Proceedings of the 2015 ACM Symposium on Theory of Computing*. ACM, New York, pp.861–870.
30. Nikolov, A. and K. Talwar (2015a). Approximating hereditary discrepancy via small width ellipsoids. In: *Proceedings of the Twenty-Sixth Annual ACM-SIAM Symposium on Discrete Algorithms. SODA 2015*. SIAM, Philadelphia, PA, pp.324–336. **Invited to Special Journal Issue**.

31. Nikolov, A. and K. Talwar (2015b). On the Hereditary Discrepancy of Homogeneous Arithmetic Progressions. *Proc. Amer. Math. Soc.* 143(7), 2857–2863.
32. Andoni, A., A. Nikolov, K. Onak, and G. Yaroslavtsev (2014). Parallel algorithms for geometric graph problems. In: *STOC'14—Proceedings of the 2014 ACM Symposium on Theory of Computing*. ACM, New York, pp.574–583.
33. Dwork, C., A. Nikolov, and K. Talwar (2014). Using convex relaxations for efficiently and privately releasing marginals [extended abstract]. In: *Computational geometry (SoCG'14)*. ACM, New York, pp.261–270. **Invited to Special Journal Issue**.
34. Bolot, J., N. Fawaz, S. Muthukrishnan, A. Nikolov, and N. Taft (2013). Private decayed predicate sums on streams. In: *Database theory—ICDT 2013*. ACM, New York, pp.284–295.
35. Fawaz, N., S. Muthukrishnan, and A. Nikolov (2013). "Nearly optimal private convolution". In: *Algorithms—ESA 2013*. Vol. 8125. Lecture Notes in Comput. Sci. Springer, Heidelberg, pp. 445–456.
36. Nikolov, A., K. Talwar, and L. Zhang (2013). The geometry of differential privacy: the sparse and approximate cases. In: *STOC'13—Proceedings of the 2013 ACM Symposium on Theory of Computing*. ACM, New York, pp.351–360. **Invited to Special Journal Issue**.
37. Muthukrishnan, S. and A. Nikolov (2012). Optimal private halfspace counting via discrepancy. In: *STOC'12—Proceedings of the 2012 ACM Symposium on Theory of Computing*. ACM, New York, pp.1285–1292.
38. Newman, A., O. Neiman, and A. Nikolov (2012). Beck's three permutations conjecture: a counterexample and some consequences. In: *2012 IEEE 53rd Annual Symposium on Foundations of Computer Science—FOCS 2012*. IEEE Computer Soc., Los Alamitos, CA, pp.253–262.
39. Charikar, M., A. Newman, and A. Nikolov (2011). Tight hardness results for minimizing discrepancy. In: *Proceedings of the Twenty-Second Annual ACM-SIAM Symposium on Discrete Algorithms. SODA 2011*. SIAM, Philadelphia, PA, pp.1607–1614.
40. Mir, D. J., S. Muthukrishnan, A. Nikolov, and R. N. Wright (2011). Pan-Private Algorithms via Statistics on Sketches. In: *Proceedings of the 30th ACM SIGMOD-SIGACT-SIGART Symposium on Principles of Database Systems, PODS 2011*. ACM, pp.37–48.

B. Chapters

1. Nikolov, A. (2020). "Some of Jiří Matoušek's Contributions to Combinatorial Discrepancy Theory". In: *Discrepancy Theory*. Berlin, Boston: De Gruyter, pp. 147 –172.
2. Nikolov, A. (2016). "Geometric Approaches to Answering Queries". In: *Encyclopedia of Algorithms*, pp.828–834.

C. **Books edited**
N/A

8. **Non-Refereed Publications**

1. Bhattacharyya, A., F. Grandoni, A. Nikolov, B. Saha, S. Saurabh, A. Vijayaraghavan, and Q. Zhang (2018). Editorial: ACM-SIAM Symposium on Discrete Algorithms (SODA) 2016 Special Issue. *ACM Trans. Algorithms* 14(3). Held in Arlington, VA, January 10–12, 2016, Art. 26, 2.
2. Nikolov, A. (2014). "New Computational Aspects of Discrepancy Theory". PhD thesis. Rutgers, The State University of New Jersey.

9. **Manuscripts/Publications in Preparation**

    1. Edmonds*, A., A. Nikolov, and T. Pitassi (2022). "On Learning and Refutation in Noninteractive Local Differential Privacy".
    2. Nikolov, A. (2022). Private Query Release via the Johnson-Lindenstrauss Transform. *arXiv e-prints*. arXiv: 2208.07410 [cs.DS].
    3. Li*, L., E. Micha, A. Nikolov, and N. Shah (2021). "Partitioning Friends Fairly".

10. **Papers Presented at Meetings and Symposia**
    N/A

11. **Invited Lectures**

    1. Theory and Practice of Differential Privacy Workshop, Winter 2022
       Title: *Private Query Release via the Johnson-Lindenstrauss Transform*
    2. Harvard Theory Seminar, Fall 2021
       Title: *The Power of Factorization Mechanisms in Differential Privacy*
    3. CanaDAM Approximation Algorithms Session, Winter 2021
       Title: *Maximizing Determinants under Combinatorial Constraints*
    4. Schloss Dagstuhl Computational Geometry Seminar
       Title: *Near Neighbor Search via Average Distortion Embeddings*
    5. Schwartz Reisman Institute Seminar Series, Winter 2021
       Title: *How to analyze sensitive data: Differential Privacy and factoring your queries*
    6. Recent Advanced in Discrepancy Workshop at STOC 2020, Winter 2020
       Title: *Hereditary Discrepancy and Factorization Norms*
    7. Privacy Preserving AI Workshop at AAAI, Winter 2020
       Title: *The Power of Factorization Mechanisms in Differential Privacy*
    8. University of Chicago Theory Seminar, Fall 2019
       Title: *The Power of Factorization Mechanisms in Differential Privacy*
    9. Vector Institute Friday Seminar, Fall 2019
       Title: *The Power of Factorization Mechanisms in Differential Privacy*
    10. Georgia Tech ARC Seminar, Fall 2019
        Title: *The Power of Factorization Mechanisms in Differential Privacy*
    11. UC Berkeley Theory Lunch, Winter 2019
        Title: *Sticky Brownian Rounding and its Applications to Constraint Satisfaction Problems*
    12. TCS+ Online Seminar, Winter 2019
        Title: *Sticky Brownian Rounding and its Applications to Constraint Satisfaction Problems*
    13. Graphs at Ryerson, Winter 2019
        Title: *Tusnady's Problem and the Discrepancy of Boxes and Polytopes*
    14. Discrepancy Theory Workshop, RICAM Linz, Fall 2018
        Title: *Tusnady's Problem and the Discrepancy of Boxes and Polytopes*
    15. Avner Magen Memorial Lecture, Fields Institute, Fall 2018
        Title: *Spectral Partitioning and Nearest Neighbor Search*
    16. International Symposium on Mathematical Programming, Winter 2018
        Title: *Balancing Vectors in Any Norm*

17. CWI Workshop on Integer Programming, Winter 2018
    Title: *Balancing Vectors in Any Norm*
18. Simons Collaboration on Algorithms and Geometry, Annual Meeting, Winter 2018
    Title: *Balancing Vectors in Any Norm*
19. Banff Mathematical Foundations of Data Privacy Workshop, Winter 2018
    Title: *Geometric Lower Bounds and Algorithms for Differential Privacy*
20. Stanford Theory Seminar, Fall 2017
    Title: *Proportional Volume Sampling and Approximation Algorithms for A-Optimal Design*
21. Simons Institute Discrete Optimization via Continuous Relaxation Workshop, Fall 2017
    Title: *Discrepancy and Approximation Algorithms*
22. Simons Institute Data Privacy Planning Workshop, Winter 2017
    Title: *Privacy and Geometry*
23. Dagstuhl Computational Geometry Workshop, Winter 2017
    Title: *Maximizing Volume under Combinatorial Constraints*
24. CWI Amsterdam, Winter 2016
    Title: *Maximizing Determinants under Partition Constraints*
25. Google Research New York, Winter 2016
    Title: *On Differential Privacy and Gaussian Width*
26. Courant Institute, Workshop in Honor of Joel Spencer, Winter 2016
    Title: *Factorization Norms and the Discrepancy of Boxes*
27. Institut Henri Poincare, Secrecy and Privacy Theme, Winter 2016
    Title: *On Differential Privacy and Gaussian Width*
28. American Institute of Mathematics, Workshop on Discrepancy, Winter 2016
    Title: *Hereditary Discrepancy and Factorization Norms*
29. University of Waterloo Theory Seminar, Fall 2015
    Title: *Randomized Rounding for the Largest Simplex Problem*
30. University of Toronto Theory Seminar, Winter 2015
    Title: *Randomized Rounding for the Largest Simplex Problem*
31. Bellairs Workshop on Combinatorial Optimization, Winter 2015
    Title: *Hereditary Discrepancy and Factorization Norms*
32. DIMACS Theory Seminar, Fall 2014
    Title: *Randomized Rounding for the Largest j-Simplex Problem*
33. UW Theory Seminar, Fall 2014
    Title: *Randomized Rounding for the Largest j-Simplex Problem*
34. UW Combinatorics Seminar, Fall 2014
    Title: *Factorization Norms and Tusnády's Problem*
35. ICERM Discrepancy Theory Workshop, Fall 2014
    Title: *Factorization Norms and Tusnády's Problem*
36. NYU Geometry Seminar, Fall 2014
    Title: *Factorization Norms and Tusnády's Problem*
37. DIMACS Theory Seminar, Winter 2014
    Title: *Approximating Hereditary Discrepancy*
38. Simons Institute, Fall 2013
    Title: *Privacy in Streaming Models: Overview Talk*

39. NYU Theory Seminar, Fall 2013
    Title: *Approximating Hereditary Discrepancy*
40. IBM TJ Watson Research Center, Winter 2013
    Title: *The Geometry of Differential Privacy*
41. DIMACS Workhops on Differential Privacy, Fall 2012
    Title: *The Geometry of Differential Privacy*
42. NYU Theory Seminar, Fall 2012
    Title: *The Geometry of Differential Privacy*
43. Rutgers Discrete Math Seminar, Winter 2012
    Title: *Vector Discrepancy and the Komlos Problem*
44. DIMACS Theory Seminar, Winter 2012
    Title: *Optimal Private Halfspace Counting via Discrepancy*
45. Microsoft Research, Silicon Valley Campus, Fall 2011
    Title: *Optimal Private Halfspace Counting via Discrepancy*

D. LIST OF COURSES (in preceding 5 years)

12. A. **Undergraduate courses taught**

CSC 473 H1: Advanced Algorithm Design
Terms taught: Winter 2017, Winter 2018, Winter 2019, Winter 2020, Fall 2020
Proposed and designed the course
Course Outline: Advanced algorithm design techniques, with emphasis on the role that geometry, approximation, randomization, and parallelism play in modern algorithms. Examples are drawn from linear programming and basics of continuous optimization; randomized algorithms for string matching, graph problems, and number theory problems; streaming algorithms and parallel algorithms in the Map-Reduce model.

CSC 263 H1: Data Structures and Analysis
Terms taught: Winter 2016, Winter 2018

CSC 265 H1: Enriched Data Structures and Analysis
Terms taught: Fall 2016, Fall 2018, Fall 2019

B. **Graduate courses taught**

CSC 2412 H1: Algorithms for Private Data Analysis
Terms taught: Winter 2017 (as CSC 2419), Fall 2018, Fall 2019, Fall 2020
Proposed and designed the course.
Course Outline: This course studies privacy in data analysis from a rigorous theoretical perspective. The focus is on Differential Privacy, a formal definition of privacy in data analysis that ensures that the privacy risk to any individual increases only slightly by participating in a data analysis task. The course emphasizes the design of efficient differentially private algorithms for fundamental data analysis tasks, and, in the process, shows the connections between differential privacy and game theory, learning theory, and geometry.

CSC 2414 H1: Topics in Applied Discrete Mathematics, Discrepancy Theory in Computer Science
Terms taught: Fall 2015 *Designed the topics course.*
Course Outline: Discrepancy theory is an area of mathematics that studies how well discrete objects can approximate continuous ones. This course will be an introduction to the theory, with a focus on its many applications to computer science. We will start with the basics, and move on into computational issues that arise in discrepancy theory itself. In the final part of the course we will explore applications to computational geometry, complexity theory, the design of approximation algorithms, private data analysis, and communication complexity. Along the way, we will learn about some beautiful and powerful techniques from combinatorics, linear algebra, and convex geometry.

C. **Theses supervised**

1. Postdocs:
   Fall 2020–Fall 2021: Christopher Liaw
   Fall 2017–Fall 2019: Rafael Oliveira
2. PhD students:
   Winter 2022–Present: Haohua Tang
   Winter 2019–Present: Alexander Edmonds
   Winter 2019–Present: XinYuan Lily Li
3. MSc students:
   Fall 2017–Winter 2019: XinYuan Lily Li
   Fall 2016–Winter 2018: Sepehr Abbasi Zadeh
   Fall 2015–Winter 2017: Assimakis Kattis

D. **Other teaching and lectures given**

Endless Summer School 2010, Vector Institute
Gave a tutorial on *Local Differential Privacy*

Simons Institute Data Privacy Program Bootcamp (2019)
Gave a tutorial on *Algorithms for Answering Linear Queries*

Prague Summer School on Discrete Math 2018
Taught a five day course *Discrepancy Theory and Algorithmic Applications*

Endless Summer School 2018, Vector Institute
Gave a tutorial on *Differential Privacy*

Monte Carlo and quasi-Monte Carlo Methods 2016, Stanford
Taught a tutorial *Introduction to Combinatorial Discrepancy*

E. ADMINISTRATIVE POSITIONS

13. A. **Positions held and service on committees and organizations within the University**

Fall 2020–Winter 2021: Undergraduate Affairs Committee, First Year Learning Communities

Fall 2019–Winter 2020: Undergraduate and High School Outreach Committee, Undergraduate Admissions Committee, First Year Learning Communities

Fall 2018–Winter 2019: CSA Appointments Committee, MScAC Admissions Committee, Theory Group Graduate Admissions Coordinator

Fall 2017–Winter 2018: Undergraduate Affairs Committee

Fall 2016–Winter 2017: Hiring Committees for a joint position between Computer Science and Mathematics in Security and Privacy, and for Computer Science positions in Human Computer Interaction, and Software Engineering.

Fall 2015–Winter 2016: Graduate Affairs Committee

B. **Positions held and service on committees and organizations outside the University**
(of scholarly and academic significance)

Program Committee Chair: Theory and Practice of Differential Privacy Workshop (TPDP), 2018 and 2019

Program Committee Member: SatML 2022, NeurIPS 2022, ESA 2022, ICALP 2021, STOC 2021, ICML 2020, AAAI 2020, FOCS 2019, ICML 2019, RANDOM 2018, WADS 2017, SODA 2016

Organizer: Combinatorial and Geometric Discrepancy Workshop at BIRS (scheduled for October 2020, postponed due to COVID19; organized with Christoph Aistleitner, Nicole Tomczak-Jaegermann, and Christian Weiss)
Recent Advances in Discrepancy and Applications Workshop at STOC 2020
(with Nikhil Bansal)
Special Session on Combinatorial Discrepancy at Monte Carlo and quasi-Monte Carlo Methods 2016
(with Kunal Talwar)
Workshop on Hereditary Discrepancy and Factorization Norms (2016) at the American Institute of Mathematics (with Kunal Talwar)