Clément L. Canonne

Curriculum Vitæ

"There is a crack in everything. That's how the light gets in."
— Leonard Cohen

Professional appointments

2021– **Lecturer**, *School of Computer Science*, University of Sydney.

2019–2020 **Goldstine Postdoctoral Fellow**, *IBM Research*, San Jose.

2017–2019 **Motwani Postdoctoral Fellow**, *Stanford University*, Stanford.
Hosted by Prof. Moses Charikar.

Education

2012–2017 **Ph.D. (Computer Science)**, *Columbia University*, New York.
Adviser: Prof. Rocco Servedio.
Thesis title: *Property Testing and Probability Distributions: New Techniques, New Models, and New Goals.*

Sept. 2012 **M.Sc. (Computer Science)**, *MPRI (Parisian Master of Research in Computer Science)*, Paris, *magna cum laude.*

2011–2012 **Student**, *École Centrale Paris*[1] *(Engineering School)*, Paris, third year (last year of Master of Science).
Option *Applied Mathematics*, majoring in *Machine Learning and Computer Vision.*

June 2011 **Bachelor's Degree (Engineering)**, *École Centrale Paris*, Paris.

Spring 2011 **Exchange Student**, *Princeton University*, Princeton, NJ, United States, (Senior).

June 2010 **Bachelor's Degree (Mathematics)**, *Université Pierre et Marie Curie*, Paris, *summa cum laude.*
Specialization in Probabilities, Measure Theory and Topology (Curriculum followed alongside the studies at the École Centrale Paris).

July 2009 **Preparatory School (CPGE)**, *MP**, Competitive entrance exams.
Accepted in École Centrale Paris; additionally, enrolled as a student at the Université Pierre et Marie Curie.

2006–2009 **Preparatory School (CPGE)**, *Lycée Henri IV*, Paris, MPSI/MP*.
Intensive studies in math and physics for the highly competitive entrance exams to the French "Grandes Ecoles."

July 2006 **Baccalauréat général (Scientific Stream)**, *Lycée Henri IV*, Paris.
Mention *très bien* (highest honours).

Publications

Journal papers

Jayadev Acharya, Clément L. Canonne, Cody Freitag, Ziteng Sun, and Himanshu Tyagi. Inference under information constraints III: local privacy constraints. *IEEE Journal on Selected Areas in Information Theory*, 2021. In press.

Clément L. Canonne, Ilias Diakonikolas, Daniel M. Kane, and Alistair Stewart. Testing Bayesian networks. *IEEE Transactions on Information Theory*, 66(5):3132–3170, 2020.

Jayadev Acharya, Clément L. Canonne, and Himanshu Tyagi. Inference under information constraints II: communication constraints and shared randomness. *IEEE Transactions on Information Theory*, 66(12):7856–7877, 2020.

Jayadev Acharya, Clément L. Canonne, and Himanshu Tyagi. Inference under information constraints I: lower bounds from chi-square contraction. *IEEE Transactions on Information Theory*, 66(12):7835–7855, 2020.

Clément L. Canonne, Elena Grigorescu, Siyao Guo, Akash Kumar, and Karl Wimmer. Testing k-monotonicity: The rise and fall of Boolean functions. *Theory of Computing*, 15(1):1–55, 2019.

Eric Blais, Clément L. Canonne, and Tom Gur. Distribution testing lower bounds via reductions from communication complexity. *ACM Transactions on Computation Theory*, 11(2):6:1–6:37, 2019.

Eric Blais, Clément L. Canonne, Talya Eden, Amit Levi, and Dana Ron. Tolerant junta testing and the connection to submodular optimization and function isomorphism. *ACM Transactions on Computation Theory*, 11(4):24:1–24:33, 2019.

Clément L. Canonne and Tom Gur. An adaptivity hierarchy theorem for property testing. *computational complexity*, 27(4):671–716, 2018.

Clément L. Canonne, Ilias Diakonikolas, Themis Gouleakis, and Ronitt Rubinfeld. Testing shape restrictions of discrete distributions. *Theory of Computing Systems*, 62(1):4–62, 2018. Invited issue for STACS 2016.

Jayadev Acharya, Clément L. Canonne, and Gautam Kamath. A chasm between identity and equivalence testing with conditional queries. *Theory of Computing*, 14(19):1–46, 2018.

Clément L. Canonne, Venkatesan Guruswami, Raghu Meka, and Madhu Sudan. Communication with imperfectly shared randomness. *IEEE Transactions on Information Theory*, 63(10):6799–6818, 2017.

Clément L. Canonne, Dana Ron, and Rocco A. Servedio. Testing probability distributions using conditional samples. *SIAM Journal on Computing (SICOMP)*, 44(3):540–616, 2015.

Conference papers

Clément L. Canonne, Xi Chen, Gautam Kamath, Amit Levi, and Erik Waingarten. Random restrictions of high-dimensional distributions and uniformity testing with subcube conditioning. In *ACM–SIAM Symposium on Discrete Algorithms (SODA)*, 2021. To appear.

Clément L. Canonne and Karl Wimmer. Testing data binnings. In *APPROX/RANDOM*, volume 176 of *LIPIcs*, pages 24:1–24:13. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2020.

Clément L. Canonne, Gautam Kamath, and Thomas Steinke. The discrete gaussian for differential privacy. In *Advances in Neural Information Processing Systems 33 (NeurIPS)*, 2020.

Clément L. Canonne, Gautam Kamath, Audra McMillan, Jonathan Ullman, and Lydia Zakynthinou. Private identity testing for high-dimensional distributions. In *Advances in Neural Information Processing Systems 33 (NeurIPS)*, 2020. Spotlight Presentation.

Clément L. Canonne, Anindya De, and Rocco A. Servedio. Learning from satisfying assignments under continuous distributions. In *ACM–SIAM Symposium on Discrete Algorithms (SODA)*, pages 82–101. SIAM, 2020.

Jayadev Acharya, Clément L. Canonne, and Himanshu Tyagi. Distributed signal detection under communication constraints. In *33rd Conference on Learning Theory (COLT)*, volume 125 of *Proceedings of Machine Learning Research*, pages 41–63. PMLR, 2020.

Jayadev Acharya, Clément L. Canonne, Yanjun Han, Ziteng Sun, and Himanshu Tyagi. Domain compression and its application to randomness-optimal distributed goodness-of-fit. In *33rd Conference on Learning Theory (COLT)*, volume 125 of *Proceedings of Machine Learning Research*, pages 3–40. PMLR, 2020.

Clément L. Canonne, Gautam Kamath, Audra McMillan, Adam D. Smith, and Jonathan Ullman. The structure of optimal private tests for simple hypotheses. In *51st Annual ACM SIGACT Symposium on Theory of Computing (STOC)*, pages 310–321. ACM, 2019.

Omri Ben-Eliezer, Clément L. Canonne, Shoham Letzter, and Erik Waingarten. Finding monotone patterns in sublinear time. In *60th Annual Symposium on Foundations of Computer Science (FOCS)*, pages 1469–1494. IEEE Computer Society, 2019.

Jayadev Acharya, Clément L. Canonne, and Himanshu Tyagi. Inference under information constraints: Lower bounds from chi-square contraction. In *32nd Conference on Learning Theory (COLT)*, volume 99 of *Proceedings of Machine Learning Research*, pages 3–17. PMLR, 2019.

Jayadev Acharya, Clément L. Canonne, and Himanshu Tyagi. Communication-constrained inference and the role of shared randomness. In *36th International Conference on Machine Learning (ICML)*, volume 97 of *Proceedings of Machine Learning Research*, pages 30–39. PMLR, 2019. Long oral.

Jayadev Acharya, Clément L. Canonne, Cody Freitag, and Himanshu Tyagi. Test without trust: Optimal locally private distribution testing. In *The 22nd International Conference on Artificial Intelligence and Statistics (AISTATS)*, volume 89 of *Proceedings of Machine Learning Research*, pages 2067–2076. PMLR, 2019.

Clément L. Canonne, Ilias Diakonikolas, and Alistair Stewart. Testing for families of distributions via the Fourier transform. In *Advances in Neural Information Processing Systems 31 (NeurIPS)*, pages 10063–10074. Curran Associates, Inc., 2018.

Clément L. Canonne, Ilias Diakonikolas, Daniel M. Kane, and Alistair Stewart. Testing conditional

independence of discrete distributions. In *50th ACM Symposium on Theory of Computing (STOC)*, pages 735–748. ACM, 2018.

Eric Blais, Clément L. Canonne, Talya Eden, Amit Levi, and Dana Ron. Tolerant junta testing and the connection to submodular optimization and function isomorphism. In *ACM–SIAM Symposium on Discrete Algorithms (SODA)*, pages 2113–2132. SIAM, 2018.

Omri Ben-Eliezer and Clément L. Canonne. Improved bounds for testing forbidden order patterns. In *ACM–SIAM Symposium on Discrete Algorithms (SODA)*, pages 2093–2112. SIAM, 2018.

Clément L. Canonne and Tom Gur. An adaptivity hierarchy theorem for property testing. In *Computational Complexity Conference (CCC)*, 2017.

Clément L. Canonne, Elena Grigorescu, Siyao Guo, Akash Kumar, and Karl Wimmer. Testing k-monotonicity. In *8th Innovations in Theoretical Computer Science (ITCS)*. ACM, 2017.

Clément L. Canonne, Ilias Diakonikolas, Daniel M. Kane, and Alistair Stewart. Testing Bayesian networks. In *30th Annual Conference on Learning Theory (COLT)*, 2017.

Eric Blais, Clément L. Canonne, and Tom Gur. Distribution testing lower bounds via reductions from communication complexity. In *Computational Complexity Conference (CCC)*, 2017.

Tuğkan Batu and Clément L. Canonne. Generalized uniformity testing. In *IEEE 58th Annual Symposium on Foundations of Computer Science (FOCS)*, pages 880–889. IEEE Computer Society, 2017.

Clément L. Canonne, Themis Gouleakis, and Ronitt Rubinfeld. Sampling correctors. In *7th Innovations in Theoretical Computer Science (ITCS)*. ACM, 2016.

Clément L. Canonne, Ilias Diakonikolas, Themis Gouleakis, and Ronitt Rubinfeld. Testing shape restrictions of discrete distributions. In *33rd International Symposium on Theoretical Aspects of Computer Science (STACS)*, 2016. Invited to the *Theory of Computing Systems* Special Issue.

Clément L. Canonne. Are few bins enough: Testing histogram distributions. In *35th ACM SIGMOD-SIGACT-SIGAI Symposium on Principles of Database Systems (PODS)*. ACM, 2016.

Clément L. Canonne, Venkatesan Guruswami, Raghu Meka, and Madhu Sudan. Communication with imperfectly shared randomness. In *6th Innovations in Theoretical Computer Science (ITCS)*, 2015.

Clément L. Canonne. Big Data on the rise: Testing monotonicity of distributions. In *42nd International Conference on Automata, Languages and Programming (ICALP)*, 2015.

Eric Blais, Clément L. Canonne, Igor C. Oliveira, Rocco A. Servedio, and Li-Yang Tan. Learning circuits with few negations. In *APPROX-RANDOM*, 2015.

Jayadev Acharya, Clément L. Canonne, and Gautam Kamath. A chasm between identity and equivalence testing with conditional queries. In *APPROX-RANDOM*, 2015.

Jayadev Acharya, Clément L. Canonne, and Gautam Kamath. Adaptive estimation in weighted group testing. In *IEEE International Symposium on Information Theory (ISIT)*, 2015.

Clément L. Canonne and Ronitt Rubinfeld. Testing probability distributions underlying aggregated data. In *41st International Conference on Automata, Languages and Programming (ICALP)*, 2014.

Clément L. Canonne, Dana Ron, and Rocco A. Servedio. Testing equivalence between distributions using conditional samples. In *ACM–SIAM Symposium on Discrete Algorithms (SODA)*, 2014.

Surveys and tech reports

Clément L. Canonne. *A Survey on Distribution Testing: Your Data is Big. But is it Blue?* Number 9 in Graduate Surveys. Theory of Computing Library, 2020.

Manuscripts

Yihui Quek, Clément L. Canonne, and Patrick Rebentrost. Robust quantum minimum finding with an application to hypothesis selection. *CoRR*, abs/2003.11777, 2020.

Jayadev Acharya, Clément L. Canonne, and Himanshu Tyagi. General lower bounds for interactive high-dimensional estimation under information constraints. *CoRR*, abs/2010.06562, 2020.

Jayadev Acharya, Clément L. Canonne, Yuhan Liu, Ziteng Sun, and Himanshu Tyagi. Interactive inference under information constraints. *CoRR*, abs/2007.10976, 2020.

Research and work experience

August. 2017 **Visiting Scholar**, *Northwestern University*, with Prof. Anindya De.
Computational learning

June–July. 2016 **Visiting Scholar**, *USC*, with Prof. Ilias Diakonikolas.
Property testing (probability distributions)

May–Aug. 2014 **Summer Intern**, *Microsoft Research New England*, with Prof. Madhu Sudan.
Property testing and Communication complexity

June–Aug. 2013 **Visiting Scholar**, *MIT*, with Prof. Ronitt Rubinfeld.
Property testing (probability distributions and Boolean functions)

April–Sept. 2012 **Research Internship**, *Columbia University*, with Prof. Rocco Servedio.
Computational learning: testing and learning distributions

June–Aug. 2011 **Internship**, *CEA (Atomic and Alternative Energies Commission)*, École Centrale Paris.
Study of the efficiency of multiprocessor GPU architectures for neural networks

Feb–May. 2011 **Senior Research Project**, *Princeton University*.
Designed an approach for an automatized discovery of similarities and plagiarism in texts, from a stylistic point of view

Fall 2010 **Part-time job**, *CNES (National Centre of Space Research)*, École Centrale Paris.
Designed and developed an HMI for a rocket trajectory simulator and optimizer

May–July 2010 **Internship**, *Institut Pasteur*, Paris.
Designed and developed analysis tools in Matlab to study the electrophysiological properties of adult-born neurons (Department of Neuroscience)

Teaching experience

2012–2014 **Teaching Assistant**, *Columbia University*, New York.

- Spring 2017: COMS 6232 – Analysis of Algorithms, II
- Fall 2016: COMS 4231 – Analysis of Algorithms, I
- Spring 2015: COMS 6232 – Analysis of Algorithms, II
- Fall 2014: COMS 4252 – Introduction to Computational Learning Theory
- Spring 2014: COMS 6998 – Sublinear Time Algorithms in Learning and Property Testing
- Fall 2013: COMS 4252 – Introduction to Computational Learning Theory
- Spring 2013: COMS 6232 – Analysis of Algorithms, II
- Fall 2012: COMS 4252 – Introduction to Computational Learning Theory

2009–2011 **Mathematics Tutor**, *Foyer Bossuet*, Paris, Part-time job.
Oral examiner and tutor, in mathematics, for students in preparatory classes (CPGE)

Awards and Honors

- Morton B. Friedman Memorial Prize for Excellence at Columbia Engineering, *Columbia University (2018)*
- Andrew P. Kosoresow Memorial Award for Outstanding Performance in TA-ing and Service, *Columbia University (2017)*
- Computer Science Service Award, *Columbia University (2014, 2015, 2016, and 2017)*
- Paul Charles Michelman Memorial Award for Exemplary Service, *Columbia University (2014 and 2017)*
- Computer Science Chair's Distinguished Fellowship, *Columbia University (2012)*

Invited Talks

- 2017 Information Theory and Applications (ITA) Workshop, *February 12–17, 2017*
  `https://ita.ucsd.edu/workshop/17/`
- 2018 Information Theory and Applications (ITA) Workshop, *February 11–16, 2018*
  `https://ita.ucsd.edu/workshop/18/`
- Workshop on Data Summarization, University of Warwick, *March 19–22, 2018*
  `https://warwick.ac.uk/fac/sci/dcs/research/focs/conf2017/`
- Workshop on Local Algorithms (WOLA) 2018, *June 14–15, 2018*
  `http://people.csail.mit.edu/joanne/WOLA18.html`
- Workshop on Local Algorithms (WOLA) 2019, *July 20–22, 2019*
  `http://people.inf.ethz.ch/gmohsen/WOLA19/`
- 2019 Information Theory and Applications (ITA) Workshop, *February 10–15, 2019*
  `https://ita.ucsd.edu/ws/19/`

Service

- Program Committee member for the 29th European Symposium on Algorithms (ESA 2021), Track A (design and analysis)
- Program Committee member for RANDOM'21
- Program Committee member for the ACM-SIAM Symposium on Discrete Algorithms (SODA'21)
- Program Committee member for the 61st Annual IEEE Symposium on Foundations of Computer Science (FOCS'20)
- Program Committee member for the 11th Innovations in Theoretical Computer Science (ITCS'20)
- Co-organized a tutorial for FOCS'20: *Lower Bounds for Statistical Inference in Distributed and Constrained Settings* (with Jayadev Acharya and Himanshu Tyagi):
  `http://www.cs.columbia.edu/~ccanonne/tutorial-focs2020/`
- Co-organized a workshop for FOCS'19: *A TCS Quiver* (with Gautam Kamath):
  `http://www.cs.columbia.edu/~ccanonne/workshop-focs2019/`
- Co-organized a workshop for FOCS'17: *Frontiers in Distribution Testing* (with Gautam Kamath):
  `http://www.cs.columbia.edu/~ccanonne/workshop-focs2017/`
- Co-organized a workshop for FOCS'16: *(Some) Orthogonal Polynomials and their Applications to TCS* (with Gautam Kamath):
  `http://www.cs.columbia.edu/~ccanonne/workshop-focs2016/`
- Co-editor for the Property Testing Review Blog:
  `https://ptreview.sublinear.info`
- Co-organizer for the TCS+ online seminar series in theoretical computer science:
  `https://sites.google.com/site/plustcs/`
- Co-organizer for the Foundations of Data Science Virtual Talk Series, an online seminar series on the theory of data science:
  `https://sites.google.com/view/dstheory`
- External reviewer for
  - SODA '14, '15, '17, '18, '19, '20; ICALP '14, '16, '17, '18, '19; RANDOM '14, '15, '18, '20; COLT '14, '15, '16, '17, '19, '20; MFCS '15, '20; STACS '16, '17, '18; CCC '16, '17; STOC '14, '15, '17, '18, '19, '20, '21; FOCS '15, '16, '17, '18, '19; ESA '17; ALT '17, '18, '20; PODS '18; ICML '20, '21; ISIT '18, '19; ITCS '18, '19, '21; ITC '20; NeurIPS '18, '19, '20; AISTATS '19; LATIN '20; ITC' 20
  - ACM Transactions on Computation Theory (TOCT), AMS Mathematical Reviews, Algorithmica, Annals of Statistics, Entropy, Foundations and Trends in Theoretical Computer Science (FnTTCS), IEEE Journal on Selected Areas in Information Theory (IEEE JSAIT), IEEE Transactions on Information Theory (IEEE ToIT), Journal of Privacy and Confidentiality (JPC), Mathematical Statistics and Learning, Quantum, Random Structures & Algorithms (RSA), SIAM Journal on Computing (SICOMP), and Theoretical Computer Science.
- "Happy Hour Tzar" (monthly social events for graduate students and Faculty), "Coffee Hour Tzar" (initiated weekly social events for graduate students and Faculty), and "Campus Visit Tzar," Computer Science Department (Columbia University)
- GÉNÉPI (non-profit organization): interventions and lessons in prison (2010–2011)

Languages

English	Fluent
French	Mother tongue
Spanish, Italian	Basic

References available upon request

[1] The École Centrale Paris is one of the 5 top-rated French *grandes écoles* (literally "grand schools"), i.e., higher education establishments outside the framework of the public universities system. Unlike public universities who accept all candidates who hold a baccalauréat, the grandes écoles select their students through competitive written and oral exams, usually undertaken after two or three years of dedicated preparatory classes (the "CPGE," or *Classes Préparatoires aux Grandes Écoles*).