

# Pritish Kamath

Research Scientist  
Google Research

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📄 [pritchkamath.github.io](https://pritchkamath.github.io)

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## Employments

- May 2021 - **Research Scientist**  
(ongoing) **Google Research**  
*Areas:* Algorithms, Machine Learning, Data Privacy
- Oct 2019 - **Post-doctoral Scholar**  
Apr 2021 **Toyota Technological Institute at Chicago**  
*Advisor:* Nathan Srebro

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## Education

- 2019 **Ph.D.** in Electrical Engineering & Computer Sciences  
**Massachusetts Institute of Technology**  
*Advisors:* Madhu Sudan (Harvard) & Ronitt Rubinfeld (MIT)  
*Ph.D. Thesis:* Some Hardness Escalation Results in Computational Complexity
- 2015 **S.M.** in Electrical Engineering & Computer Sciences  
**Massachusetts Institute of Technology**  
*Advisor:* Madhu Sudan (Microsoft Research New England, MIT)  
*S.M. Thesis:* Communication Complexity of Permutation-Invariant Functions
- 2012 **B.Tech.** in Computer Science and Engineering  
**Indian Institute of Technology, Bombay**  
*Advisor:* Supratik Chakraborty  
*B.Tech. Thesis:* Studies on Preservation Theorems and Weaker Ehrenfeucht-Fraïssé games  
▷ **President of India Gold Medal** for best academic performance in the graduating batch across all disciplines of B.Tech, and  
▷ **Institute Silver Medal** for best academic performance in the graduating batch of B.Tech in Computer Science and Engineering.

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## Other Positions

- **Visiting Postdoc, Simons Institute, Berkeley, CA**  
Program on *Theory of Reinforcement Learning* [Sep 2020 - Dec 2020]
- **Research Fellow, Simons Institute, Berkeley, CA**  
Program on *Foundations of Deep Learning* [May 2019 - Aug 2019]
- **Research Intern, Google DeepMind, London, UK**  
*Generalization theory for neural networks* Advisor: Csaba Szepesvári [May 2018 - Sep 2018]
- **Research Fellow, Microsoft Research India, Bangalore, India**  
*Lower Bounds in Arithmetic Complexity Theory* Advisor: Neeraj Kayal [Jun. 2012 - July 2013]

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## Awards and Honors

- 2019 **Simons Research Fellowship** for Summer 2019 program on *Foundations of Deep Learning*
- 2013-14 **Akamai Presidential Fellowship**, MIT
- 2013 **Best Paper Award**, Conference on Computational Complexity (CCC)
- 2008 **All India Rank of 21** in IIT Joint Entrance Examination (among 375,000 students)
- 2008 **Gold Medal and Certificate of Merit (top 35)** in *Indian National Physics Olympiad 2008*
- 2008 **Certificate of Merit (top 30)** in *Indian National Mathematics Olympiad 2008*

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## Invited Talks

- Sep 2020 Machine Learning Seminar at Johns Hopkins University
- Apr 2020 Machine Learning Seminar at University of Chicago
- Dec 2019 FSTTCS Workshop on **Extension Complexity and Lifting Theorems**
- Oct 2018 FOCS Workshop on **Total Search Problems in Computation, Communication and Cryptography**
- Aug 2016 Theory Seminar at UC Berkeley
- Feb 2016 Theory Seminar at Tel Aviv University

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## Publications

Note: Authors are in alphabetical order of last name unless marked with (\*)

### Journal Papers

- ToC 2020 *Optimality of Correlated Sampling Strategies* [pdf]  
Mohammad Bavarian, Badih Ghazi, Elad Haramaty,  
Pritish Kamath, Madhu Sudan, Ronald Rivest
- ToC 2020 *Monotone Circuit Lower Bounds from Resolution*  
Ankit Garg, Mika Göös, Pritish Kamath, Dmitry Sokolov
- CC 2019 *Query-to-Communication Lifting for  $P^{NP}$*   
Mika Göös, Pritish Kamath, Toniann Pitassi, Thomas Watson
- SICOMP 2016 *Arithmetic circuits: A chasm at depth three*
- CACM 2017 Ankit Gupta, Pritish Kamath, Neeraj Kayal, Ramprasad Saptharishi
- J. ACM 2014 *Approaching the chasm at depth four*  
Ankit Gupta, Pritish Kamath, Neeraj Kayal, Ramprasad Saptharishi

### Conference Papers / Manuscripts

- NeurIPS 2021 *On the Power of Differentiable Learning versus PAC and SQ Learning* [pdf]  
Emmanuel Abbe, Pritish Kamath, Eran Malach, Colin Sandon, Nathan Srebro  
**Selected for Spotlight presentation (3% acceptance rate)**
- ICML 2021 *Quantifying the Benefit of Using Differentiable Learning over Tangent Kernels* [pdf]  
(\*) Eran Malach, Pritish Kamath, Emmanuel Abbe, Nathan Srebro
- AISTATS 2021 *Does Invariant Risk Minimization Capture Invariance?* [pdf]  
(\*) Pritish Kamath, Akilesh Tangella, Danica J. Sutherland, Nathan Srebro  
**Selected for Oral Publication (3% acceptance rate)**
- COLT 2020 *Approximate is Good Enough: Probabilistic Variants of Dimension and Margin Complexity* [pdf]  
Pritish Kamath, Omar Montasser, Nathan Srebro
- CCC 2020 *On the Complexity of Modulo- $q$  Arguments and the Chevalley-Waring Theorem* [pdf]  
Mika Göös, Pritish Kamath, Katerina Sotiraki, Manolis Zampetakis

- PKC 2020 *Limits on the Efficiency of (Ring) LWE based Non-Interactive Key Exchange* [pdf]  
(invited to *J. Cryptology*)  
Siyao Guo, Pritish Kamath, Alon Rosen, Katerina Sotiraki
- ITCS 2019 *Adventures in Monotone Complexity and TFNP* [pdf]  
Mika Göös, Pritish Kamath, Robert Robere, Dmitry Sokolov
- NeurIPS 2018 *Bayesian Inference of Temporal Task Specifications from Demonstrations* [pdf]  
(\*) Ankit Shah, Pritish Kamath, Shen Li, Julie Shah
- STOC 2018 *Monotone Circuit Lower Bounds from Resolution* [pdf]  
Ankit Garg, Mika Göös, Pritish Kamath, Dmitry Sokolov
- CCC 2018 *Dimension Reduction for Polynomials over Gaussian Space and Applications* [pdf]  
Badih Ghazi, Pritish Kamath, Prasad Raghavendra
- CCC 2017 *Query-to-Communication Lifting for  $P^{NP}$*  [pdf]  
Mika Göös, Pritish Kamath, Toniann Pitassi, Thomas Watson
- ISIT 2017 *Improved bounds for universal 1-bit compressed sensing* [pdf]  
Jayadev Acharya, Arnab Bhattacharyya, Pritish Kamath
- ITCS 2017 *Compression in a Distributed Setting* [pdf]  
Badih Ghazi, Elad Haramaty, Pritish Kamath, Madhu Sudan
- FOCS 2016 *Decidability of non-interactive simulation of joint distributions* [pdf]  
Badih Ghazi, Pritish Kamath, Madhu Sudan
- SODA 2016 *Communication complexity of permutation-invariant functions* [pdf]  
Badih Ghazi, Pritish Kamath, Madhu Sudan
- RANDOM 2015 *Communication with partial noiseless feedback* [pdf]  
Bernhard Haeupler, Pritish Kamath, Ameya Velingker
- FOCS 2013 *Arithmetic circuits: A chasm at depth three* [pdf] (invited to *SICOMP*)  
Ankit Gupta, Pritish Kamath, Neeraj Kayal, Ramprasad Saptharishi
- CCC 2013 *Approaching the chasm at depth four* [pdf]  
Ankit Gupta, Pritish Kamath, Neeraj Kayal, Ramprasad Saptharishi  
**(Best Paper Award)**
- WoLLIC 2012 *Preservation under substructures modulo bounded cores* [pdf]  
(\*) Abhisekh Sankaran, Bharat Adsul, Vivek Madan, Pritish Kamath, Supratik Chakraborty
- CSL 2012 *Faster algorithms for alternating refinement relations* [pdf]  
Krishnendu Chatterjee, Siddhesh Chaubal, Pritish Kamath
- WABI 2011 *Using dominances for solving the protein family identification problem* [pdf]  
(\*) Noël Malod-Dognin, Mathilde Le Boudic-Jamin, Pritish Kamath, Rumén Andonov

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## Professional Service

- Program Committees: COLT 2021, FOCS 2021
- Reviewed papers for major journals and conferences such as SIAM J. Comp., IEEE Transactions, NeurIPS, ICML, ICLR, COLT, ALT, STOC, FOCS, SODA, CCC, ICALP, ITCS.

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## Programming Languages

- Proficient C++, Python (+ Tensorflow/PyTorch)
- Familiar Go, Java, Matlab, WebPPL, Scheme

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## Teaching Experience

- Fall 2018 **Teaching Assistant, MIT**  
6.UAR : Undergraduate Research Opportunities Program (SuperUROP)  
Instructors: Profs. Dina Katabi, Piotr Indyk, Michael Watts
- Spring 2017 **Teaching Assistant, MIT**  
6.856 : Randomized Algorithms  
Instructor: Prof. David Karger
- Spring 2015 **Teaching Assistant, MIT**  
6.841 : Advanced Complexity Theory  
Instructor: Prof. Dana Moshkovitz
- Spring 2012 **Teaching Assistant, IIT Bombay**  
CS 208 : Automata Theory and Logic  
Instructor: Prof. Supratik Chakraborty