

Ayush Sekhari

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CURRENT POSITION

Chan and Zuckerberg Initiative (CZI)
Senior Research Scientist

July 2025 – present

My work focuses on developing and applying reinforcement learning (RL) algorithms to advance state-of-the-art AI models in protein engineering and computational biology.
I joined CZI through the acqui-hire of EvolutionaryScale AI (a frontier AI startup).

PROFESSIONAL EXPERIENCE

Post Ph.D. Experience

Postdoctoral Associate, Massachusetts Institute of Technology (MIT), USA Sep 2022 – Jul 2025
Advisor: Prof. Alexander (Sasha) Rakhlin

Research Internships During Ph.D.

Google Research, Mountain View, USA <i>Mentors: Badih Ghazi, Pritish Kamath, Ravi Kumar, Pasin Manurangsi, and Chiyuan Zhang</i>	Summer 2022
University of Alberta, Edmonton, Canada <i>Mentors: Prof. Csaba Szepesvári</i>	Summer 2021
Google Research, New York City, USA <i>Mentors: Prof. Mehryar Mohri</i>	2020–2021
Google Research, New York City, USA <i>Mentors: Prof. Mehryar Mohri, Chris Dann, Claudio Gentile</i>	Summer 2019
Toyota Technological Institute, Chicago, USA <i>Mentors: Prof. Natan Srebro, Srinadh Bhojanapalli</i>	Summer 2018

Internships Before Ph.D.

AI Residency, Google Brain, Mountain View, USA <i>Mentors: James Davidson, Vikas Sindhwani</i>	Jun 2016 – May 2017
Goldman Sachs, Hong Kong <i>Mentors: Elie Franko, Dunstan Marris</i>	Summer 2017
Undergraduate Internship, CBL, University of Cambridge, UK <i>Mentors: James Lloyd, Prof. Zoubin Ghahramani</i>	Summer 2015
Summer Undergraduate Research Grant for Excellence, IIT Kanpur, India <i>Mentors: Prof. Amey Karkare (IIT-K), Sumit Gulwani (MSR Redmond)</i>	Summer 2014
Research on Fluid Dynamics, Tata Institute of Fundamental Research (TIFR), India <i>Mentors: Prof. Rajeev Bhalerao</i>	Summer 2013

EDUCATION

Cornell University, Ithaca, NY, USA 2017–2022
Ph.D. in Computer Science
Advisors: Prof. Karthik Sridharan (primary), Prof. Robert Kleinberg (co-advisor)
Thesis: Non-convex and Interactive Learning via Stochastic Optimization

Institute Rank 1, **President's Gold Medal** for the best academic performance in the graduating batch of 2016.

RESEARCH INTERESTS

My research focused on exploring how ideas from Interactive Learning can unlock new capabilities in machine learning models and systems. My work spans areas such as **Reinforcement Learning (RL)**, **machine unlearning and privacy**, **control theory**, **AI for science**, **LLMs** and **optimization**, and draws on both theoretical analysis and empirical methods

SELECTED AWARDS

Finalist for Meta AI PhD Fellowship in Statistics, 2022.

Best Student Paper Award at COLT 2019.

Best Talk Award, Honorable Mention, New York Academy of Science (NYAS) 2020.

Presidents Gold Medal, IIT Kanpur, 2016.

PUBLICATIONS AND PREPRINTS

Note: In accordance with conventions in mathematical sciences, papers marked with $(\alpha\beta)$ above my name list authors in alphabetical order by last name.

Publications

(C.1) [The Gaussian Mixing Mechanism: Renyi Differential Privacy via Gaussian Sketches](#)

Omri Lev, Vishwak Srinivasan, Moshe Shenfeld, Katrina Ligett, Ayush Sekhari, Ashia C Wilson
Neural Information Processing Systems 2025 (NeurIPS 2025).

(C.2) [GaussMark: A Practical Approach for Structural Watermarking of Language Models](#)

Adam Block, Alexander Rakhlin, Ayush Sekhari $(\alpha\beta)$.
International Conference on Machine Learning 2025 (ICML 2025).

(C.3) [System Aware Unlearning Algorithms: Use Lesser, Forget Faster](#)

Linda Lu, Ayush Sekhari $(\alpha\beta)$, Karthik Sridharan .
International Conference on Machine Learning 2025 (ICML 2025).

(C.4) [The Space Complexity of Learning-Unlearning Algorithms](#)

Yeshwanth Cherapanamjeri, Sumegha Garg, Nived Rajaraman, Ayush Sekhari $(\alpha\beta)$, Abhishek Shetty .
Conference on Learning Theory 2025 (COLT 2025).

(C.5) [The Role of Environment Access in Agnostic Reinforcement Learning](#)

Akshay Krishnamurthy, Gene Li, Ayush Sekhari $(\alpha\beta)$.
Conference on Learning Theory 2025 (COLT 2025).

(C.6) [Computationally Efficient RL under Linear Bellman Completeness for Deterministic Dynamics](#)

Runzhe Wu*, Ayush Sekhari* (equal contribution), Akshay Krishnamurthy, Wen Sun.
International Conference on Learning Representations 2024 (ICLR 2025). (Oral Presentation)

(C.7) [Machine Unlearning Fails to Remove Data Poisoning Attacks](#)

Martin Pawelczyk†, Jimmy Z. Di† (equal contribution), Yiwei Lu, Gautam Kamath*, Ayush Sekhari* (equal advising), Seth Neel*.
International Conference on Learning Representations 2024 (ICLR 2025).

Preliminary version at 2nd Workshop on Generative AI and Law at International Conference of Machine Learning (ICML) 2024. (**Oral Presentation**).

(C.8) **Offline Reinforcement Learning: Role of State Aggregation and Trajectory Data**

Zeyu Jia, Alexander Rakhlin, Ayush Sekhari^(αβ), Chen-Yu Wei
Conference on Learning Theory 2024 (COLT 2024).

(C.9) **Harnessing Density Ratios for Online Reinforcement Learning**

Philip Amortila, Dylan J. Foster, Nan Jiang, Ayush Sekhari^(αβ), Tengyang Xie
International Conference on Learning Representations 2024 (ICLR 2024).
(Spotlight Presentation)

(C.10) **Offline Data Enhanced On-Policy Policy Gradient with Provable Guarantees**

Yifei Zhou*, Ayush Sekhari* (equal contribution), Yuda Song, Wen Sun
International Conference on Learning Representations 2024 (ICLR 2024).

(C.11) **Random Latent Exploration for Deep Reinforcement Learning**

Srinath Mahankali, Zhang-Wei Hong, Ayush Sekhari, Alexander Rakhlin, Pulkit Agrawal
International Conference on Machine Learning 2024 (ICML 2024).

(C.12) **When is Agnostic Reinforcement Learning Statistically Tractable?**

Zeyu Jia, Gene Li, Alexander Rakhlin, Ayush Sekhari^(αβ), Nati Srebro
Neural Information Processing Systems 2023 (NeurIPS 2023).

(C.13) **Contextual Bandits and Imitation Learning via Preference-Based Active Queries**

Ayush Sekhari^(αβ), Karthik Sridharan, Wen Sun, Runzhe Wu
Neural Information Processing Systems 2023 (NeurIPS 2023).

(C.14) **Selective Sampling and Imitation Learning via Online Regression**

Ayush Sekhari^(αβ), Karthik Sridharan, Wen Sun, Runzhe Wu
Neural Information Processing Systems 2023 (NeurIPS 2023).

(C.15) **Hidden Poison: Machine Unlearning Enables Camouflaged Poisoning Attacks**

Jimmy Z. Di*, Jack Douglas*, Jayadev Acharya, Gautam Kamath, Ayush Sekhari
Neural Information Processing Systems 2023 (NeurIPS 2023).
Short version at *ML Safety Workshop, and at Trustworthy and Socially Responsible Machine Learning (TSRML) at NeurIPS 2022*.

(C.16) **Model-Free Reinforcement Learning with the Decision-Estimation Coefficient**

Dylan J. Foster, Noah Golowich, Jian Qian, Alexander Rakhlin, Ayush Sekhari^(αβ)
Neural Information Processing Systems 2023 (NeurIPS 2023).

(C.17) **Ticketed Learning-Unlearning Schemes**

Badih Ghazi, Pritish Kamath, Ravi Kumar, Pasin Manurangsi, Ayush Sekhari^(αβ), Chiyuan Zhang
Conference on Learning Theory 2023 (COLT 2023).

(C.18) **Computationally Efficient PAC RL in POMDPs with Latent Determinism and Conditional Embeddings**

Masatoshi Uehara, Ayush Sekhari, Jason D. Lee, Nathan Kallus, Wen Sun
International Conference on Machine Learning (ICML 2023).

(C.19) **Hybrid RL: Using Both Offline and Online Data Can Make RL Efficient**

Yuda Song*, Yifei Zhou* (equal contribution), Ayush Sekhari, Andrew Bagnell, Akshay Krishnamurthy, Wen Sun
International Conference on Learning Representations 2023 (ICLR 2023).

Short version at *Offline RL Workshop at NeurIPS 2022*.

(C.20) **On the Complexity of Adversarial Decision Making**

Dylan J. Foster, Alexander Rakhlin, Ayush Sekhari^(αβ), Karthik Sridharan
Neural Information Processing Systems 2022 (NeurIPS 2022). (Oral Presentation)

(C.21) **From Gradient Flow on Population Loss to Learning with Stochastic Gradient Descent**

Satyen Kale, Jason D. Lee, Chris De Sa, Ayush Sekhari^(αβ), Karthik Sridharan.
Neural Information Processing Systems 2022 (NeurIPS 2022).

(C.22) **Provably Efficient Reinforcement Learning in Partially Observable Dynamical Systems**

Masatoshi Uehara, Ayush Sekhari, Jason D. Lee, Nathan Kallus, Wen Sun.
Neural Information Processing Systems 2022 (NeurIPS 2022).

(C.23) **Guarantees for Epsilon-Greedy Reinforcement Learning with Function Approximation**

Christoph Dann, Yishay Mansour, Mehryar Mohri, Ayush Sekhari^(αβ), Karthik Sridharan.
International Conference on Machine Learning 2022 (ICML 2023).
Short version at *Reinforcement Learning and Decision Making (RLDM) 2022*.

(C.24) **SGD: The role of Implicit Regularization, Batch-size and Multiple Epochs**

Satyen Kale, Ayush Sekhari^(αβ), Karthik Sridharan.
Neural Information Processing Systems 2021 (NeurIPS 2021).

(C.25) **Agnostic Reinforcement Learning with Low-Rank MDPs and Rich Observations**

Christoph Dann, Yishay Mansour, Mehryar Mohri, Ayush Sekhari^(αβ), Karthik Sridharan.
Neural Information Processing Systems 2021 (NeurIPS 2021). (Spotlight Presentation)

(C.26) **Remember What You Want to Forget: Algorithms for Machine Unlearning**

Ayush Sekhari, Jayadev Acharya, Gautam Kamath, Ananda Theertha Suresh.
Neural Information Processing Systems 2021 (NeurIPS 2021).
Short version at *Theory and Practice of Differential Privacy (TPDP) 2021*.

(C.27) **Neural Active Learning with Performance Guarantees**

Pranjal Awasthi, Christoph Dann, Claudio Gentile, Ayush Sekhari^(αβ), Zhilei Wang.
Neural Information Processing Systems 2021 (NeurIPS 2021).

(C.28) **Reinforcement Learning with Feedback Graphs**

Christoph Dann, Yishay Mansour, Mehryar Mohri, Ayush Sekhari^(αβ), Karthik Sridharan.
Neural Information Processing Systems 2020 (NeurIPS 2020).
Short version at *ICML 2020 Theoretical foundations of RL workshop*.

(C.29) **Second-Order Information in Non-Convex Stochastic Optimization: Power and Limitations.**

Yossi Arjevani, Yair Carmon, Dylan Foster, Ayush Sekhari^(αβ), Karthik Sridharan.
Conference on Learning Theory 2020 (COLT 2020).

(C.30) **The Complexity of Making the Gradient Small in Stochastic Convex Optimization.**

Dylan J. Foster, Ayush Sekhari^(αβ), Ohad Shamir, Nathan Srebro, Karthik Sridharan, Blake Woodworth.
Conference on Learning Theory 2019 (COLT 2019). (Best Student Paper Award)

(C.31) **Uniform Convergence of Gradients for Non-Convex Learning and Optimization.**

Dylan Foster, Ayush Sekhari^(αβ), Karthik Sridharan.
Neural Information Processing Systems 2018 (NeurIPS 2018).
Short version at *ICML 2018 Non-convex Optimization workshop*.

Workshop Publications

(W.1) [A Brief Study of In-Domain Transfer and Learning from Fewer Samples using a Few Simple Priors.](#)

Marc Pickett, Ayush Sekhari^(αβ), James Davidson.

ICML 2017 workshop: Picky Learners - Choosing Alternative Ways to Process Data.

Awarded the **Best Paper Award, Honorable Mention** among the workshop submissions.

Papers Currently Under Submission / ArXiv Preprints

(A.1) [UCD: Unlearning in LLMs via Contrastive Decoding](#)

Vinith M. Suriyakumar, Ayush Sekhari*, Ashia Wilson* (equal advising role).

(A.2) [Unstable Unlearning: The Hidden Risk of Concept Resurgence in Diffusion Models](#)

Vinith Menon Suriyakumar†, Rohan Alur† (equal contribution), Ayush Sekhari^(αβ), Manish Raghavan, Ashia C. Wilson.

(A.3) [Langevin Dynamics: A Unified Perspective on Optimization via Lyapunov Potentials](#)

August Y. Chen, Ayush Sekhari^(αβ), Karthik Sridharan .

INVITED TALKS

ML for an Interactive World: From Learning to Unlearning

Machine Learning and Inference Research (MLIR) team, Netflix Research, USA

Nov 2025

The Role of Environment Access in Agnostic Reinforcement Learning

ML and Optimization Seminar, University of Washington, Seattle, USA

Sep 2025

Alg-ML Seminar, Princeton University, Princeton, USA

Oct 2025

Computationally Efficient RL under Linear Bellman Completeness for Deterministic Dynamics

Northeast Systems and Control Workshop

May 2025

GaussMark: A Practical Approach for Structural Watermarking of Language Models

ML Seminar, University of Illinois Urbana-Champaign

May 2025

Offline Reinforcement Learning: Role of State Aggregation and Trajectory Data

COLT, Edmonton, CA

Jun 2024

Adaptive Learning in Complex Environments Workshop, TTIC, Chicago, USA

Apr 2024

Offline Data Enhanced On-Policy Policy Gradient

Virtual RL theory Seminar Series

Apr 2024

CSA theory seminar, IISc Bangalore, India

Apr 2024

Ticketed Learning-Unlearning Schemes

Annual Conference on Information Sciences and Systems (CISS), Princeton, USA

Mar 2024

CS Theory Seminar, University of Pennsylvania, Philadelphia, USA

Mar 2024

CSA theory seminar, IISc Bangalore, India

Apr 2024

Max Planck Institute for Intelligent Systems, Tübingen, Germany

May 2024

Conference on Learning Theory (COLT), Bangalore, India

Jul 2023

CS Theory Seminar, Cornell University, Ithaca, USA

Nov 2023

Machine Unlearning: Algorithms, complexity, and new challenges

Meta AI Research, USA

Apr 2023

Hybrid RL: Using Both Offline and Online Data Can Make RL Efficient

ImprobableAI (Prof. Pulkit Agarwal's lab) meeting, MIT	Mar 2023
On the Complexity of Adversarial Decision Making	
Virtual RL Theory Seminar Series	Jul 2023
BLISS seminar, UC Berkeley, USA	Feb 2023
Information Theory and Applications (ITA) Workshop, San Diego, USA	Feb 2023
Theory seminar, UCSD, San Diego, USA	Feb 2023
Microsoft research NYC, USA	Feb 2023
ML Tea, Massachusetts Institute of Technology, USA	Apr 2023
When does SGD learn?	
Prof. Dan Roy's lab, University of Toronto, CA	Oct 2022
Mathematical Foundations of deep learning reading group, ETH Zurich	Nov 2022
Remember What You Want to Forget: Algorithms for Machine Unlearning	
AI Seminar, Cornell University	Feb 2022
Prof. Jiantao Jiao's lab, UC Berkeley	Aug 2021
SGD: The role of implicit regularization, batch-size and multiple-epochs	
Mathematical foundations of deep learning reading group, ELLIS, ETH Zurich	May 2022
Foundations of Data Science (FODS) seminar, IISC (Tsinghua University), China	Apr 2022
Collaboration on the theoretical foundations of deep learning (MODL) monthly meeting	Feb 2022
Theory Seminar, Cornell University	May 2021
Algorithms and Theory Seminar, University of Waterloo (CA)	Nov 2021
Learning Theory Seminar, Google Research NY	Nov 2021
Agnostic Reinforcement Learning with Low-Rank MDPs and Rich Observations	
Artificial Intelligence (AI) Seminar, Cornell University	Mar 2021
RL reading group, Cornell University	Jun 2021
Second-Order Information in Non-Convex Stochastic Optimization: Power and Limitations	
Highlights beyond SIGMETRICS 2021, Beijing, China (Virtual)	Jun 2021
Spotlight talk, Annual ML Symposium, New York Academy of Sciences (NYAS)	Mar 2020
Best Talk Award, Honorable Mention	
Conference on Learning Theory (COLT), Conference talk	Jul 2020
Learning Theory Seminar, Google NYC	Nov 2020
Theory Tea, Cornell University	Nov 2020
The Complexity of Making the Gradient Small in Stochastic Convex Optimization	
Intern Talk Series, Google Research, New York	Jul 2019
Theory Seminar, Cornell University	Nov 2019
Uniform Convergence of Gradients for Non-Convex Learning and Optimization	
Annual ML Symposium, New York Academy of Sciences (NYAS)	Feb 2019
ICML workshop on Modern Trends in Non-convex Optimization for ML	Jun 2018

RESEARCH ADVISING AND MENTORING

I find great pleasure in mentoring. Below are the students whom I have closely advised through research projects, which have resulted in published papers and arxiv-preprints (currently under review):

Ph.D. Students

Omri Lev, MIT
Vinith M. Suriyakumar, MIT
Zeyu Jia, MIT
Gene Li, TTIC → Two Sigma
August Y. Chen, Cornell University
Linda Lu, Cornell University
Runzhe Wu, Cornell University
Nived Rajaraman, UC Berkeley → MSR, NYC
Yiwei Lu, University of Waterloo

Masters / Undergraduate Students

Srinath Mahankali, MIT, Class of 2025
Jimmy Z. Di, University of Waterloo, Class of 2024
Jack Douglas, University of Waterloo, Class of 2025
Yifei Zhou, Cornell → PhD at UC Berkeley, Class of 2023

TEACHING EXPERIENCE

I have worked as a Teaching Assistant (TA) for the following courses:

CS6783: Machine Learning Theory, Cornell University TA for Prof. Karthik Sridharan (Graduate level course)	Fall 2018
CS4820: Introduction to Analysis of Algorithms, Cornell University Head TA for Prof. Robert Kleinberg	Spring 2018
CS4786/5786: Machine Learning for Data Science, Cornell University Head TA for Prof. Karthik Sridharan	Fall 2017
ESC101: Fundamentals of Computing, IIT Kanpur, India TA for Prof. Nitin Saxena	Fall 2015

I believe that focused reading groups and seminars are essential for forming and nurturing research communities. Towards that, I have initiated and organized the following:

Learning Theory Seminar, Google Research NYC Co-organized with Prof. Mehryar Mohri and Chris Dann.	2019-2022
Learning Theory Seminar, Cornell University Co-organized under Prof. Karthik Sridharan and Prof. Nika Haghtalab.	Fall 2019
Concentration Inequalities Seminar, Cornell University Organized with Prof. Karthik Sridharan.	Spring 2019
Theory Tea, Cornell University Weekly gathering of PhD students to present and discuss recent trends in theoretical computer science and machine learning.	Fall 2018
Algorithmic Game Theory Reading Group, Cornell University Graduate student reading group organized under Prof. Eva Tardos.	Fall 2018

ADDITIONAL AWARDS

General Proficiency Medal, Computer Science and Engineering, IIT Kanpur, 2016.

V. Rajaraman Scholarship, Department of Computer Science and Engineering, IIT Kanpur, 2016.

Cambridge-Tubingen PhD Fellowship 2016 (Declined).

Academic Excellence Award, IIT Kanpur, 2013, 2014, 2015.

Shmt. Dharam Vati Garg Donor Scholarship, IIT Kanpur, 2015.

Summer Undergraduate Research Grant for Excellence (SURGE), IIT Kanpur, 2014.

National Initiative for Undergraduate Sciences (NIUS) Scholar for fundamental research in Physics, Government of India, 2013.

Din Dayal's Gold Medal for excellence in Mathematics, Delhi Public School, Faridabad, India, 2012.

Kishore Vaigyanic Protsahan Yojana (KVPY) scholarship, Department of Science and Technology, Government of India, 2011.

All India Rank 11 (amongst 1,140,000 students) in All India Engineering Entrance Examination, 2012.

All India Rank 1 in the International Olympiad of Science 2010 (conducted by SSE).

PROFESSIONAL SERVICE

Conference / Workshop Organization

Updatable Machine Learning Workshop (UpML)

Jul 2022

Organized a day long research workshop at International Conference of machine learning (ICML) 2022, Baltimore, USA, on addressing post-deployment issues in ML.

Co-organizers: Prof. Jayadev Acharya and Prof. Gautam Kamath.

Foundations of Post-training (FoPT)

Jun 2025

Organized a research workshop at Conference on Learning Theory (COLT) 2025, Lyon, France, on post-training of LLMs.

Co-organizers: Adam Block, Dylan Foster, Audrey Huang, Akshay Krishnamurthy, Nived Rajaraman

Area Chair / PC Member

Neural Information Processing Systems (NeurIPS)

2025

Algorithmic Learning Theory

2024

Conference on Learning Theory

2021-24

Reviewing

Conferences:

- Algorithmic Learning Theory (ALT) 2021-23
- Neural Information Processing Systems (NeurIPS) 2019-24
- International Conference on Machine Learning (ICML) 2019-21
- International Conference on Learning Representation 2019, 2023
- Foundations of Responsible Computing (FORC) 2021
- Artificial Intelligence and Statistics Conference (AISTATS) 2019, 2023
- Innovations in Theoretical Computer Science (ITCS) 2020
- International Symposium on Information Theory (ISIT) 2020

Journals:

- Journal of Complexity, 2021
- Journal of Machine Learning Research, 2021-22

Workshops:

- Workshop on Understanding and Improving Generalization in Deep Learning at ICML 2019
- Updatable Machine Learning Workshop at ICML 2022

Diversity, Equity, and Inclusion Efforts

- **Part of Communications Committee at Learning Theory Alliance** 2024-present
Website - <https://let-all.com/>.
- **Learning Theory Alliance** Fall 2023
Volunteered for organization of mentoring tables for Fall 2023 Mentorship Workshop focused on communicating one's research verbally.
- **Mentor for Project SHORT** Fall 2021-present
A student led organization working to shrink the socioeconomic gap in graduate school applications.
- **Girls Adventures in Math (GAIM), Cornell University** 2018, 2019
Volunteered to help organize an in-person Math Olympiad for upper elementary and middle school girls in NY state. GAIM has moved fully online post-COVID, thus making it accessible to teams all over USA.
- **Institute Counselling Service, IIT Kanpur** 2013-15
Worked as an Academic Mentor (2013), Student Guide (2013), Senior Academic Mentor (2014), and Link Student (2014) to advise and mentor peer undergraduate students.

Miscellaneous

- **Reviewer for Ph.D. Admissions**, CS Department, Cornell University Fall 2018
- **TA training for Computing and Information Science undergraduates**, Cornell University Fall 2020

REFERENCES

Prof. Karthik Sridharan

Associate Professor, Department of Computer Science, Cornell University, USA
Email: ks999@cornell.edu

Prof. Alexander (Sasha) Rakhlin

Professor, Laboratory for Information and Decision Systems (LIDS), MIT, USA
Email: rakhlin@mit.edu

Prof. Nathan (Nati) Srebro

Professor, Toyota Technological Institute at Chicago (TTIC), USA
Email: nati@ttic.edu

Prof. Wen Sun

Assistant Professor, Department of Computer Science, Cornell University, USA
Email: ws455@cornell.edu

Prof. Gautam Kamath

Assistant Professor, Cheriton School of Computer Science, University of Waterloo, Canada
Email: g@csail.mit.edu

Prof. Pulkit Agrawal

Associate Professor, Electrical Engineering and Computer Science (EECS), MIT, USA
Email: pulkitag@mit.edu / pulkitag-admin@mit.edu