Abdulkadir Canatar

Center for Computational Neuroscience, Flatiron Institute
160 5th Avenue, New York, NY 10010

 canatara.github.io   ✉ canatara@gmail.com   [GitHub](https://github.com)   [Google Scholar](https://scholar.google.com)

Education

Harvard University | Cambridge, MA
Ph.D. in Physics | 2016–2022
- Thesis: *Statistical mechanics of generalization in kernel regression and wide neural networks*

Sabancı University | Istanbul, Turkey
M.Sc. in Physics | 2015–2016
- Thesis: *Fabrication and characterization of suspended graphene devices*

Sabancı University | Istanbul, Turkey
B.Sc. in Electronics Engineering | 2010–2015

Research & Professional Experience

Flatiron Institute – Simons Foundation | New York, NY
Flatiron Research Fellow | 2022 – Present
- Supervisor: Prof. SueYeon Chung

Harvard University | Cambridge, MA
Teaching & Research Assistant | 2017 – 2022
- Supervisor: Prof. Cengiz Pehlevan

Sabancı University | Istanbul, Turkey
Undergraduate & Masters Researcher | 2012 – 2016
- Supervisor: Prof. İsmet İnönü Kaya

Publications

Equal Contribution indicated by asterisk (*)

1. **Sample-Size-Invariant Measure of Dimensionality** Chanwoo Chun*, **Abdulkadir Canatar***, SueYeon Chung and Daniel D. Lee — ***2025 (In Submission)***

2. **Spectral Analysis of Representational Similarity with Limited Neurons** Hyunmo Kang*, **Abdulkadir Canatar*** and SueYeon Chung — ***NeurIPS, 2025***

3. **Estimating Neural Representation Alignment from Limited Inputs and Features** Chanwoo Chun*, **Abdulkadir Canatar***, SueYeon Chung and Daniel D. Lee — ***CCN, 2025***

4. **Statistical Mechanics of Support Vector Regression** Abdulkadir Canatar and SueYeon Chung — ***Physical Review E, 2025***

5. **A Spectral Theory of Neural Prediction and Alignment** Abdulkadir Canatar, *Jenelle Feather*, Albert Wakhloo, and SueYeon Chung — ***NeurIPS, 2023 (Spotlight)***

6. **Bandwidth Enables Generalization in Quantum Kernel Models Abdulkadir Canatar**, Evan Peters, Cengiz Pehlevan, Stefan M. Wild and Ruslan Shaydulin — ***TMLR, 2023***

7. **A Kernel Analysis of Feature Learning in Deep Neural Networks Abdulkadir Canatar** and Cengiz Pehlevan — ***58th Annual Allerton Conference, 2022***

8. **Asymptotics of representation learning in finite Bayesian neural networks** Jacob Zavatone-Veth, **Abdulkadir Canatar**, Benjamin S. Ruben and Cengiz Pehlevan — ***NeurIPS, 2021***

9. **Out-of-Distribution Generalization in Kernel Regression Abdulkadir Canatar**, Blake Bordelon and Cengiz Pehlevan — ***NeurIPS, 2021***

10. **Spectral Bias and Task-Model Alignment Explain Generalization in Kernel Regression and Infinitely Wide Neural Networks Abdulkadir Canatar**, Blake Bordelon and Cengiz Pehlevan — ***Nature Communications, 2021***

11. **Strong localization in suspended monolayer graphene by intervalley scattering** Cenk Yanik, Vahid Sazgari, **Abdulkadir Canatar** and İsmet İ. Kaya — ***Physical Review B, 2021***

12. **Spectrum Dependent Learning Curves in Kernel Regression and Wide Neural Networks** Blake Bordelon, **Abdulkadir Canatar** and Cengiz Pehlevan — ***ICML, 2020***

Conference Talks/Posters

- **Spectral Analysis of Representational Similarity with Limited Neurons** COSYNE 2025 (Poster)
- **A Spectral Theory of Neural Prediction and Alignment** COSYNE 2024 (Poster)
- **Out-of-Distribution Generalization in Kernel Regression** INFORMS 2023 (Invited Talk)
- **Statistical Mechanics of Generalization in Kernel Regression and Wide Neural Networks** APS March Meeting 2022 (Talk)
- **Statistical Mechanics of Generalization in Kernel Regression** DeepMath 2020 (Talk)
- **A theory of generalization in kernel regression and wide neural networks** Neuromatch 2020 (Talk)

Teaching

Harvard University | Teaching Assistant

- **APMATH 50 - Introduction to Applied Mathematics** (Spring 2020–2021, Spring 2021–2022)
- **APMATH 226 - Neural Computation** (Fall 2020–2021, Fall 2021–2022)
- **PS 2 - Mechanics, Elasticity, Fluids, and Diffusion** (Fall 2019–2020)
- **PS 12a - Mechanics from an Analytic and Numerical Perspective** (Spring 2018–2020)
- **PHYS 232 - Advanced Electromagnetism** (Fall 2017–2018)

Technical Skills

- **Programming:** Python (PyTorch, JAX, NumPy, SciPy, Pandas), Mathematica, SLURM
- **Research:** Statistical physics, computational neuroscience, machine learning theory

Awards & Scholarships

- **Derek Bok Center (Harvard)** – Certificate of Distinction in Teaching Awards (Multiple Terms)

- **Harvard University** – Purcell Fellowship (2016–2017)

- **Sabancı University** – Dean's High Honor List & Honors Scholarship (2010–2016)