

Abdulkadir Canatar

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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

1. **Sample-Size-Invariant Measure of Dimensionality** Chanwoo Chun, *Abdulkadir Canatar*, SueYeon Chung and Daniel D. Lee — *2025 (In Submission)* (*Equal Contribution)
2. **Spectral Analysis of Representational Similarity with Limited Neurons** Hyunmo Kang, *Abdulkadir Canatar* and SueYeon Chung — *NeurIPS, 2025* (*Equal Contribution)
3. **Estimating Neural Representation Alignment from Limited Inputs and Features** Chanwoo Chun, *Abdulkadir Canatar*, SueYeon Chung and Daniel D. Lee — *CCN, 2025* (*Equal Contribution)
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)* (*Equal Contribution)

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)