Hyeongjin Kim

PhD Student · Condensed Matter Theory

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Education

Boston University *Boston, MA*

Ph.D. in Physics *2021 - present*

Advisor: Anatoli Polkovnikov

Williams College *Williamstown, MA*

B.A. in Physics *2017 - 2021*

Advisor: Frederick Strauch
Thesis: *Optimal Control and Circuit Synthesis of Quantum Gates*
Academic Honor Societies: *Phi Beta Kappa*, *Sigma Xi*

Research Experience

Research Fellow – Boston University *Boston, MA*

Advisor: Anatoli Polkovnikov *2022-present*

- Investigating the geometry of quantum integrability and chaos of many-body systems in an adiabatic landscape determined by the quantum geometric tensor.

Summer Research Associate – CCQ, Flatiron Institute, Simons Foundation *New York, NY*

Advisors: Matthew Fishman, Dries Sels *2022*

- Developing a novel tensor network method to propagate eigenstates of many-body systems over the parameter space via the quantum geometric tensor.

Research Assistant – Department of Physics, Williams College *Williamstown, MA*

Advisor: Frederick Strauch *2019-2021*

- Analytically developed and numerically optimized gate pulses for fast, high-fidelity gates in quantum computers.

Research Assistant – Department of Physics, Williams College *Williamstown, MA*

Advisor: Katharine Jensen *2018*

- Investigated the mechanics of adhesive contacts of rigid glass spheres with silicone gel surfaces of varying Young's modulus.

Publications

Hyeongjin Kim, Matthew T. Fishman, and Dries Sels. (2023). Variational adiabatic transport of tensor networks. Preprint arXiv:2311.00748.

Hyeongjin Kim and Anatoli Polkovnikov. (2023). Integrability is attractive. Preprint arXiv:2308.09745.

Invited Talks

Center for Computational Quantum Physics, Simons Foundation *New York, NY*

Adiabatic evolution of matrix product states with the adiabatic gauge potential *April 2023*

Department of Physics, New York University *New York, NY*

Computing Excited States via Adiabatic Transformations *March 2023*

Talks

May 2023. *Adiabatic evolution of matrix product states with the adiabatic gauge potential*. Boston University.

March 2023. *Integrable Attractors in the Adiabatic Landscape of Chaotic Systems*. APS March Meeting. Las Vegas, NV.

May 2021. *Optimal Control and Circuit Synthesis of Quantum Gates*. Williams College.

July 2018. *Dynamics of adhesive wetout and detachment*. UMass Amherst Soft Matter Day. Amherst, MA.

Posters

August 2019. *Fast and High-Fidelity Quantum Logic Gates for Parametrically Coupled Transmons*. Williams College.

August 2018. *Dynamics of adhesive wetout and detachment*. Williams College.

Awards and Honors

2021 **Phi Beta Kappa Induction**, PBK
2018-2020 **Summer Science Research Fellowship**, Williams College

Teaching Experience

2022 **General Physics I**, Boston University
2021 **Introduction to Physics**, Boston University
2020 **Algorithm Design and Analysis**, Williams College
2019 **Mathematical Methods for Scientists**, Williams College

Other Extracurricular & Work Activities

Williams College Society of Physics Students *Williamstown, MA*
Co-Chair *2020-2021*
- Organized and hosted departmental events for physics students.

Williams College Council *Williamstown, MA*
Finance Committee Member *2018-2019*
- Analyzed budgets and constructed optimal funding strategies for college council.

Other Skills

Language: Python, Julia, LaTeX
Tech: Mathematica, MATLAB, Git