

Kamphol (Kam) Akkaravarawong

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EDUCATION

UNIVERSITY OF CALIFORNIA BERKELEY

PH.D. CANDIDATE IN PHYSICS

Condensed matter theory

GPA: 3.92 / 4.0

2016 - 2023

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

B.S. IN PHYSICS

GPA: 5.0 / 5.0

2012 - 2016

COURSEWORK

Data structures & algorithms

Statistics/Probability

Machine learning

Linear algebra

Multivariable calculus

Differential equations

Statistical mechanics

Quantum mechanics

Quantum field theory

SKILLS

Python: *numpy*, *scipy*, *pandas*,

scikit-learn, *Jupyter*, *PySpark*, *Hadoop*

Julia • *JavaScript* • *C*

Cluster computing

Markov Chain Monte Carlo (MCMC)

Linux • *Vim* • *Docker*

Unix command • Shell script

• *Git* • *LaTeX*

Mathematica • *MATLAB*

INTERESTS

Stock Investing

Home Automation

Hardware hacking

Microcontrollers/electronics

Self-hosting

LANGUAGES

English (fluent)

Thai (native)

Mandarin Chinese (beginner)

SUMMARY: Theoretical physicist who is interested in applying analytical and computational problem-solving skills to complex, dynamic real-world problems.

EXPERIENCE

ANALYTICAL MODELING | UC BERKELEY

Modeled the actual materials with the many-body quantum framework, and discovered a novel mechanism for how a superconductor can mediate a many-body interaction between magnetic atoms [1, 2].

- Performed a complex calculation, where the numerical factor error is critical, and derived a closed-form expression for the many-body interaction strength.
- Collaborated with experimentalists to understand the limitations of instruments and actual materials, then designed an experimental scheme that manipulates and utilizes the newly discovered many-body interaction as a quantum simulator.

NUMERICAL SIMULATION & DATA ANALYSIS | UC BERKELEY

Modeled a 2D quantum system of *interacting* particles in a random potential and developed an end-to-end quantum *Markov chain Monte Carlo* (MCMC) simulation from scratch in Julia and Python to study the model's phase diagrams [3].

- Implemented the Metropolis and the worm algorithm, developed a Monte Carlo move that accelerates the convergence rate of the simulation, and deployed the large-scale simulation on Linux clusters.
- Obtained data of large system size ($\sim 30k$ lattice sites, state-of-the-art) inaccessible by other numerical methods such as exact matrix diagonalization.
- Analyzed and interpreted $\sim 1.3M$ clean data points of floats to map out the phase diagrams. Discovered a new disorder-induced phase of matter, and predicted the effect of its presence on real experimental data.

COMMUNICATION & LEADERSHIP | UC BERKELEY

- Taught 2 advanced graduate courses (30 students) and 3 introductory undergraduate course (40 students) as a graduate student instructor.
- Mentored 2 undergraduate students and 2 junior graduate students.

AWARDS

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|------|--------------|---|
| 2011 | Gold medal | 42 nd International Physics Olympiad |
| 2011 | Bronze medal | 12 th Asian Physics Olympiad |
| 2016 | honorary | Phi Beta Kappa, MIT |
| 2018 | fellowship | Leo Felicov Fellowship, UC Berkeley |

PUBLICATIONS

- [1] **Akkaravarawong, K.**, J. I. Väyrynen, J. D. Sau, E. A. Demler, L. I. Glazman, and N. Y. Yao. Probing and dressing magnetic impurities in a superconductor. *Physical Review Research*, 1(3):033091, November 2019.
- [2] **Akkaravarawong, K.**, M. Bintz, J. D. Sau, L. I. Glazman, N. Y. Yao, and J. I. Väyrynen. Yu-shiba-rusinov singlet wave function for a single quantum impurity. *Manuscript in preparation*, 2022.
- [3] **Akkaravarawong, K.**, S. Gazit, M. Dupont, C. Laumann, and N. Y. Yao. The compressible bosonic integer quantum hall in the presence of random chemical potential disorder. *Manuscript in preparation*, 2022.
- [4] **Akkaravarawong, K.**, O. Shtanko, and L. Levitov. Ballistic guided electron states in graphene. *arXiv:1512.04185*, 2015.