Kamphol (Kam) Akkaravarawong

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EDUCATION

UNIVERSITY OF CALIFORNIA BERKELEY

PH.D. CANDIDATE IN PHYSICS
Condensed matter theory
GPA: 3.92 / 4
2016 - Dec 2023 (expected)

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

2011	Gold medal	42nd International Physics Olympiad
2011	Bronze medal	12th Asian Physics Olympiad
2016	honor	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. Probing and dressing magnetic impurities in a superconductor. *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.