

DANIEL K. WEISS

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2145 Sheridan Road, Evanston IL, 60208

EDUCATION

Northwestern University

5th Year PhD (expected graduation August 2022)

Department of Physics and Astronomy

September 2017 - Present

GPA: 3.92/4.00

Wesleyan University

B.A. in physics with High Honors

Thesis: "Phase transitions of charged particles in a Paul trap"

August 2013- May 2017

GPA: 4.10/4.00

Rank: 4th out of 738

RESEARCH INTERESTS

Superconducting circuits, noise/error protected qubits, simulating quantum systems, quantum optimal control

RESEARCH EXPERIENCE

Northwestern University

Superconducting qubit theory group led by Prof. Jens Koch

Evanston, IL

September 2017-Present

- Theoretical condensed matter research in quantum computing
- Developed novel techniques for analyzing protected qubits
- Contributed to the open-source repository squbits

Northrop Grumman Corporation

Superconducting qubit theory group led by Dr. David Ferguson

Linthicum, MD

Summer 2018

- Developed analytical and numerical tools for simulating the current-mirror qubit
- Collaborated with experimentalists implementing the current mirror

Wesleyan University

Ion trapping theory group led by Prof. Reinhold Blumel

Middletown, CT

August 2014-September 2017

- Theoretical/computational physics research in ion trapping
- Established the cloud-to-crystal transition as a critical phenomenon
- Improved and extended codebase for tracking time evolution of ion clouds

PUBLICATIONS

1. **D. K. Weiss**, Wade DeGottardi, Jens Koch and D. G. Ferguson, "Variational tight-binding method for simulating large superconducting circuits," Phys. Rev. Research 3, 033244 (2021)
2. H. Zhang, S. Chakram, T. Roy, N. Earnest, Y. Lu, Z. Huang, **D. K. Weiss**, J. Koch and D. I. Schuster, "Universal Fast-Flux Control of a Coherent, Low-Frequency Qubit," Phys. Rev. X 11, 011010 (2021)
3. **D. K. Weiss**, Andy C. Y. Li, D. G. Ferguson and Jens Koch, "Spectrum and Coherence Properties of the Current-Mirror Qubit," Phys. Rev. B 100, 224507 (2019)
4. Y.S. Nam, **D. K. Weiss** and R. Blümel, "Explicit, analytical radio-frequency heating formulas for spherically symmetric nonneutral plasmas in a Paul trap," Phys. Lett. A 381, 3441 (2017)

5. **D. K. Weiss**, Y.S. Nam and R. Blümel, “Lifetimes of metastable ion clouds in a Paul trap: Power-law scaling,” Phys. Rev. A 93, 043424 (2016)

HONORS, PRIZES AND FELLOWSHIPS

Quantum Computing Graduate Research Fellowship, funded by the Army Research Office, 2019-2022

Bertman Prize, Wesleyan University, 2017

· Awarded to a senior majoring in physics who displays a particularly resourceful and creative approach to physics research

Phi Beta Kappa, Wesleyan University, early election, Fall 2016

Karl van Dyke Prize, Wesleyan University, 2016

· Awarded each year to one or more students majoring in physical science who show outstanding achievement in academic work and a promise of productivity in a professional career

Dean’s List, Wesleyan University, 2014-2017

CONTRIBUTED PRESENTATIONS

1. **D. K. Weiss**, Helin Zhang, Chunyang Ding, David I. Schuster and Jens Koch, “High-fidelity entangling gates for fluxonium qubits via flux modulation of a tunable coupler,” APS March Meeting 2022, T41.05
2. **D. K. Weiss**, Wade DeGottardi, Jens Koch and D. G. Ferguson, “Tight binding as a numerical tool for diagonalizing superconducting-circuit Hamiltonians,” APS March Meeting 2021, X30.02
3. **D. K. Weiss**, D. G. Ferguson, M. S. Khalil, Andy C. Y. Li, Jens Koch, “Numerical Methods for Current Mirror Qubit Simulations,” APS March Meeting 2019, B29.04
4. **D. K. Weiss**, Y.S. Nam and R. Blümel, “Discovery of an Unexpected Liquid Phase in the Periodically Driven Paul Trap,” APS March Meeting 2017, P13.09
5. **D. K. Weiss**, Y.S. Nam and R. Blümel, “Universal critical phenomena of the cloud crystal phase transition in the Paul trap: Powerlaws,” APS March Meeting 2016, X50.05

INVITED PRESENTATIONS

1. **D. K. Weiss**, J. Bryon, Z. Huang, X. You, Jens Koch, A. A. Houck, “Allocation of time-dependent flux: towards experimental verification,” Quantum Computing Program Review (QCPR) July 2021
2. **D. K. Weiss**, Wade DeGottardi, Jens Koch and D. G. Ferguson, “Tight binding as a numerical tool for diagonalizing superconducting-circuit Hamiltonians,” QCPR October 2020

TEACHING EXPERIENCE

Northwestern University

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|----------------------|-------------------------|
| 1. College Physics I | <i>Fall 2018</i> |
| 2. College Physics I | <i>Winter 2018-2019</i> |
| 3. College Physics I | <i>Spring 2019</i> |

Wesleyan University

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| 1. Principles of Chemistry | <i>Fall 2014</i> |
| 2. General Physics II | <i>Spring 2015</i> |
| 3. Quantum Mechanics I | <i>Spring 2016</i> |
| 4. Vectors and Matrices | <i>Fall 2016</i> |
| 5. General Physics I | <i>Fall 2016</i> |
| 6. Quantum Mechanics I | <i>Spring 2017</i> |

MENTORING EXPERIENCE

1. **Athena Zheng and Sydney Wang**, Illinois Math and Science Academy *Fall 2018-Spring 2020*
Introduced high-school students to quantum algorithms as well as introductory superconducting circuit theory
2. **Elijah Hansen**, Northwestern University *Spring 2021-Present*
Mentor undergraduate in superconducting circuit theory and best practices for contributing to squbits

REFERENCES

1. Jens Koch, Northwestern University **email:** jens-koch@northwestern.edu
2. David Schuster, University of Chicago **email:** david.schuster@uchicago.edu
3. David Ferguson, Northrop Grumman Corporation **email:** david.george.ferguson@ngc.com
4. Reinhold Blümel, Wesleyan University **email:** rblumel@wesleyan.edu

MISCELLANEOUS

Played NCAA DIII ice hockey as a goaltender for Wesleyan University.