

# DANIEL K. WEISS

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2145 Sheridan Road, Evanston IL, 60208

## EDUCATION

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### 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: 4<sup>th</sup> out of 738

## RESEARCH INTERESTS

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

## RESEARCH EXPERIENCE

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### 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

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1. **D. K. Weiss**, Helin Zhang, Chunyang Ding, Yuwei Ma, David I. Schuster, Jens Koch, "Fast high-fidelity gates for galvanically-coupled fluxonium qubits using strong flux modulation," arXiv:2207.03971
2. **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)
3. 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)
4. **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)

5. 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)
6. **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

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**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

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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

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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

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### Northwestern University

1. College Physics I
2. College Physics I
3. College Physics I

*Fall 2018*  
*Winter 2018-2019*  
*Spring 2019*

### Wesleyan University

1. Principles of Chemistry
2. General Physics II
3. Quantum Mechanics I
4. Vectors and Matrices

*Fall 2014*  
*Spring 2015*  
*Spring 2016*  
*Fall 2016*

5. General Physics I
6. Quantum Mechanics I

*Fall 2016*  
*Spring 2017*

## MENTORING EXPERIENCE

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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

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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

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