Benjamin Cohen-Stead

benwcs@gmail.com
github/cohensbw
Personal Website
Google Scholar
LinkedIn

Education

University of California, Davis — Davis, Ca
Ph.D. in Physics, Advisor: Professor Richard Scalettar — 2016–2022

Whitman College — Walla Walla, Wa
B.A. in Physics — 2010–2014

Professional Experience

University of Tennessee Knoxville — Knoxville, Tn
Postdoctoral Research Associate — 2022–current
Principal Investigator: Professor Steven Johnston

Los Alamos National Laboratory — Los Alamos, NM
Graduate Student Researcher — 2020–2022
Mentor: Dr. Kipton Barros

- Project: Langevin Methods for Quantum Electron-Phonon Simulations

Picarro, Inc. — Santa Clara, Ca
Associate Data Scientist — 2014–2016

- Responsibilities: software development, algorithm design, data analysis

Picarro, Inc. — Santa Clara, Ca
Data Science Intern — Summer 2014

University of Rochester, Department of Physics — Rochester, NY
Physics REU Student, Mentor: Professor Stephen Teitel — Summer 2013

- Research: numerical investigation of two-dimensional granular systems

Awards

UC-National Lab In-Residence Graduate Fellowship — 2020–2022
National Lab: Los Alamos National Laboratory — Mentor: Dr. Kipton Barros

- Project: Langevin Methods for Quantum Electron-Phonon Simulations

Open Source Codes

SmoQyDQMC.jl: https://github.com/SmoQySuite/SmoQyDQMC.jl.git
Flexible implementation of the determinant quantum Monte Carlo algorithm for simulating Hubbard and electron-phonon interactions.

JDQMCFramework.jl: https://github.com/SmoQySuite/JDQMCFramework.jl.git
Julia package exporting a suite of types and routines useful for writing a determinant quantum Monte Carlo code.

JDQMCMeasurements.jl: https://github.com/SmoQySuite/JDQMCMeasurements.jl.git
Julia package implementing various correlation measurements that are frequently made in determinant quantum Monte Carlo simulations.

StableLinearAlgebra.jl: https://github.com/cohensbw/StableLinearAlgebra.jl.git
Exports numerically stable linear algebra routines used in determinant quantum Monte Carlo codes.

Checkerboard.jl: https://github.com/cohensbw/Checkerboard.jl.git
Implements the checkerboard approximation for representing exponentiated kinetic for tight-binding models.

MuTuner.jl: https://github.com/cohensbw/MuTuner.jl.git
Implements the algorithm introduced in Ref. [8], a method for tuning the chemical potential in grand canonical Monte Carlo simulations to achieve a target particle density.

LatticeUtilities.jl: https://github.com/cohensbw/LatticeUtilities.jl.git
Julia package for representing arbitrary periodic lattice geometries.

Patents

Aggregate leak indicator display systems and methods US Patent Number: 10962437
Assignee: Picarro, Inc. Date of Patent: March 30, 2021
Inventors: A. Nottrott, S. MacMullin, S.M. Tan, B. Cohen-Stead, C. Rella

Publications

[1] O. Bradley, B. Cohen-Stead, S. Johnston, K. Barros, and R. T. Scalettar, "Charge order in the kagome lattice Holstein model: A hybrid Monte Carlo study", *npj Quantum Materials*, vol. 8, no. 1, p. 21, 2023.

[2] B. Cohen-Stead, K. Barros, R. Scalettar, and S. Johnston, "A hybrid Monte Carlo study of bond-stretching electron–phonon interactions and charge order in $BaBiO_3$", *npj Computational Materials*, vol. 9, no. 1, p. 40, 2023.

[3] P. M. Dee, B. Cohen-Stead, S. Johnston, and P. Hirschfeld, "Charge correlations suppress unconventional pairing in the Holstein model", *Physical Review B*, vol. 107, no. 10, p. 104 503, 2023.

[4] S. Karakuzu, B. Cohen-Stead, C. D. Batista, S. Johnston, and K. Barros, "Flexible class of exact hubbard-stratonovich transformations", *Phys. Rev. E*, vol. 107, p. 055 301, 5 May 2023.

[5] S. Malkaruge Costa, B. Cohen-Stead, A. Tanjaroon Ly, J. Neuhaus, and S. Johnston, "A comparative determinant quantum monte carlo study of the acoustic and optical variants of the su-schrieffer-heeger model", *arXiv e-prints*, arXiv–2307, 2023.

[6] A. Tanjaroon Ly, B. Cohen-Stead, S. Malkaruge Costa, and S. Johnston, "A comparative study of the superconductivity in the holstein and optical su-schrieffer-heeger models", *arXiv e-prints*, arXiv–2307, 2023.

[7] B. Cohen-Stead, O. Bradley, C. Miles, G. Batrouni, R. Scalettar, and K. Barros, "Fast and scalable quantum Monte Carlo simulations of electron-phonon models", *Phys. Rev. E*, vol. 105, p. 065 302, 6 Jun. 2022.

[8] C. Miles, B. Cohen-Stead, O. Bradley, S. Johnston, R. Scalettar, and K. Barros, "Dynamical tuning of the chemical potential to achieve a target particle number in grand canonical Monte Carlo simulations", *Phys. Rev. E*, vol. 105, p. 045 311, 4 Apr. 2022.

[9] G. Paleari, F. Hébert, B. Cohen-Stead, K. Barros, R. T. Scalettar, and G. G. Batrouni, "Quantum Monte Carlo study of an anharmonic Holstein model", *Physical Review B*, vol. 103, no. 19, p. 195 117, 2021.

[10] B. Cohen-Stead, K. Barros, Z. Y. Meng, C. Chen, R. Scalettar, and G. Batrouni, "Langevin simulations of the half-filled cubic Holstein model", *Physical Review B*, vol. 102, no. 16, p. 161 108, 2020.

[11] B. Cohen-Stead, N. Costa, E. Khatami, and R. Scalettar, "Effect of strain on charge density wave order in the Holstein model", *Physical Review B*, vol. 100, no. 4, p. 045 125, 2019.