Michael Lindsey

quantumtative.github.io

POSITIONS

Courant Institute of Mathematical Sciences, New York University
NSF Postdoctoral Fellow, 9/2019 - present

EDUCATION

University of California, Berkeley, PhD in Applied Mathematics, 8/2019
Advisor: Lin Lin

Stanford University, BS in Mathematics (Honors), 6/2015

AWARDS

- SIAM Student Paper Prize (2019)
- NSF Mathematical Sciences Postdoctoral Research Fellowship (2019)
- Bernard Friedman Memorial Prize in Applied Mathematics, UC Berkeley (2018)
- NSF Graduate Research Fellowship (2016)
- National Defense Science and Engineering Graduate (NDSEG) Fellowship (declined) (2016)
- Kennedy Thesis Prize, Stanford University (2015)
- Firestone Medal for Excellence in Undergraduate Research, Stanford University (2015)
- J.E. Wallace Sterling Award for Scholastic Achievement, Stanford University (2015)

RESEARCH INTERESTS

Specifically: analysis and numerics for electronic structure theory and quantum many-body physics
Broadly: applied analysis, statistical mechanics, mathematical physics

PREPRINTS

Lin Lin and Michael Lindsey. **Bold Feynman diagrams and the Luttinger-Ward formalism via Gibbs measures. Part II: Non-perturbative analysis.** Preprint, arXiv:1809.02901.

Lin Lin and Michael Lindsey. **Bold Feynman diagrams and the Luttinger-Ward formalism via Gibbs measures. Part I: Perturbative approach.** Preprint, arXiv:1809.02900.

PUBLICATIONS

Lin Lin and Michael Lindsey. **Variational embedding for quantum many-body problems.** *Communications on Pure and Applied Mathematics*, to appear.

Yuehaw Khoo, Lin Lin, Michael Lindsey, and Lexing Ying. **Semidefinite relaxation of multi-marginal optimal transport for strictly correlated electrons in second quantization.** *SIAM Journal on Scientific Computing*, to appear.

Lin Lin and Michael Lindsey. **Sparsity pattern of the self-energy for classical and quantum impurity problems.** *Annales Henri Poincaré* 21, 2219 (2020).

Xiaojie Wu, Michael Lindsey, Tiangang Zhou, Yu Tong, and Lin Lin. **Enhancing robustness and efficiency of density matrix embedding theory via semidefinite programming and local correlation potential fitting.** *Physical Review B* 102, 085123 (2020). [Editor's Suggestion.]

Carlos Mejuto-Zaera, Leonardo Zepeda-Núñez, Michael Lindsey, Norm Tubman, Birgitta Whaley, and Lin Lin. **Efficient hybridization fitting for dynamical mean-field theory via semi-definite relaxation.** *Physical Review B* 101, 035143 (2020).

Xiaojie Wu, Zhi-Hao Cui, Yu Tong, Michael Lindsey, Garnet Kin-Lic Chan, and Lin Lin. **Projected density matrix embedding theory with applications to the two-dimensional Hubbard model.** *The Journal of Chemical Physics*, 151, 064108 (2019).

Lin Lin and Michael Lindsey. **Convergence of adaptive compression methods for Hartree-Fock-like equations.** *Communications on Pure and Applied Mathematics* 72, 451 (2019).

Lin Lin and Michael Lindsey. **Variational structure of Luttinger-Ward formalism and bold diagrammatic expansion for Euclidean lattice field theory.** *Proceedings of the National Academy of Sciences* 115, 2282 (2018).

Michael Lindsey and Yanir A. Rubinstein. **Optimal transport via a Monge-Ampère optimization problem.** *SIAM Journal on Mathematical Analysis* 49, 3073 (2017).

Otis Chodosh, Vishesh Jain, Michael Lindsey, Lyuboslav Panchev, and Yanir A. Rubinstein. **On discontinuity of planar optimal transport maps.** *Journal of Topology and Analysis* 7, 239 (2015).

Robert A. Handler, Ivan Savelyev, and Michael Lindsey. **Infrared imagery of streak formation in a breaking wave.** *Physics of Fluids* 24, 121701 (2012).

INVITED PRESENTATIONS

Variational embedding for quantum many-body problems
QMC Seminar, Flatiron Institute, 6/2020

Optimal transport via a Monge-Ampère optimization problem
SIAM Conference on the Mathematics of Data Science, 5/2020

Variational embedding for quantum many-body problems
"Revolutionary Advances in Correlated Electron Materials" MURI Group Meeting, 4/2020

Variational embedding for quantum many-body problems
Modeling and Simulation Group Meeting, Courant Institute, 10/2019

Toward sharp error analysis of extended Lagrangian molecular dynamics for polarizable force field simulation
Ki-Net Young Researchers Workshop, University of Maryland, 10/2019

Variational embedding for quantum many-body problems
Modeling and Simulation Group Meeting, Courant Institute, 10/2019

Toward sharp error analysis of extended Lagrangian molecular dynamics for polarizable force field simulation
Analysis Seminar, Courant Institute, 9/2019

Semidefinite relaxation of multi-marginal optimal transport, with application to strictly correlated electrons in second quantization
ICIAM, 7/2019

Strictly correlated electrons in second quantization at finite temperature
Workshop: Optimal Transport Methods in Density Functional Theory, BIRS, 2/2019

Adaptive compression for Hartree-Fock-like equations
SIAM Conference on Applied Linear Algebra, 5/2018

A classical statistical mechanics approach to understanding Green's function methods and the Luttinger-Ward formalism
Workshop: Mathematical Methods in Quantum Chemistry, MFO, Oberwolfach, 3/2018

Optimal transport via a Monge-Ampère optimization problem
Bay Area Differential Geometry Seminar, UC Davis, 4/2017

Optimal transport via a Monge-Ampère optimization problem
Applied Mathematics Seminar, UC Berkeley, 11/2016

Optimal transport via a Monge-Ampère optimization problem
Workshop: Computational Optimal Transportation, Centre de Recherches Mathématiques, 7/2016

TEACHING EXPERIENCE

University of California, Berkeley, Graduate Student Instructor

- Spring 2018: Math 54 (Linear Algebra and Differential Equations)
- Spring 2016: Math 53 (Multivariable Calculus)
- Fall 2015: Math 1B (Calculus)