Jason Kaye

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Position

Research Fellow, Center for Computational Mathematics and Center for Computational Quantum Physics, Flatiron Institute — 2019–present

Education

Ph.D. in Mathematics, Courant Institute of Mathematical Sciences, New York University — 2014 - 2020
Dissertation: *Integral equation-based numerical methods for the time-dependent Schrödinger equation*
Adviser: Dr. Leslie Greengard

Master of Advanced Study in Mathematics, University of Cambridge — 2013 - 2014

Sc.B. in Mathematics, A.B. in Applied Mathematics, Brown University — 2008 - 2012

Internship

Research intern, DOE SULI program, Lawrence Berkeley National Laboratory — 2012 - 2013
Advisers: Dr. Lin Lin & Dr. Chao Yang

Honors and awards

Wilhelm Magnus Memorial Prize, Courant Institute of Mathematical Sciences — 2019

NYU Graduate School of Arts & Sciences Dean's Student Travel Grant — 2019

National Defense Science & Engineering Graduate Fellowship — 2014 - 2017

NSF Graduate Research Fellowship Honorable Mention — 2014

Thatcher Prize, Fitzwilliam College, University of Cambridge — 2014

Honorary Senior Scholar of Fitzwilliam College, University of Cambridge — 2014 - 2015

Phi Beta Kappa — 2012

S.C. Rosenberger Prize for a Distinguished Honors Thesis — 2012

Brown University Undergraduate Teaching & Research Award — 2011

Publications and preprints

1. J. Kaye, H. U. R. Strand, *libdlr: Efficient imaginary time calculations using the discrete Lehmann representation*, arxiv:2110.06765, 2021.
2. J. Kaye, H. U. R. Strand, *A fast time domain solver for the equilibrium Dyson equation*, arxiv:2110.06120, 2021.

3. J. Hoskins, J. Kaye, M. Rachh, J. C. Schotland, *Analysis of single-excitation states in quantum optics*, arxiv:2110.07049, 2021.
4. J. Hoskins, J. Kaye, M. Rachh, J. C. Schotland, *A fast, high-order numerical method for the simulation of single-excitation states in quantum optics*, arxiv:2109.06956, 2021.
5. J. Kaye, K. Chen, O. Parcollet, *Discrete Lehmann representation of imaginary time Green's functions*, arxiv:2107.13094, 2021.
6. J. Kaye, D. Golež, *Low rank compression in the numerical solution of the nonequilibrium Dyson equation*, SciPost Phys. 10 (4), 091, 2021.
7. J. Kaye, A. Barnett, L. Greengard, *A high-order integral equation-based solver for the time-dependent Schrödinger equation*, Comm. Pure Appl. Math., 2021.
8. J. Kaye, L. Greengard, *A fast solver for the narrow capture and narrow escape problems in the sphere*, J. Comput. Phys. X 5, 100047, 2020.
9. J. Kaye, L. Greengard, *Transparent boundary conditions for the time-dependent Schrödinger equation with a vector potential*, arxiv:1812.04200, 2018.
10. Y. Bao, J. Kaye, C. S. Peskin, *A Gaussian-like immersed boundary kernel with three continuous derivatives and improved translational invariance*, J. Comput. Phys. 316, 139-144, 2016.
11. J. Kaye, L. Lin, C. Yang, *A posteriori error estimator for adaptive local basis functions to solve Kohn-Sham density functional theory*, Commun. Math. Sci. 13, 1741-1773, 2015.
12. S. Field, C. R. Galley, J. S. Hesthaven, J. Kaye, M. Tiglio, *Fast prediction and evaluation of gravitational waveforms using surrogate models*, Phys. Rev. X 4, 031006, 2014.

Conferences & invited talks

Computational & Applied Mathematics Colloquium, University of Chicago	November 2021
Applied Mathematics Seminar, UC Berkeley/Lawrence Berkeley National Laboratory	November 2021
Applied & Interdisciplinary Mathematics Seminar, University of Michigan	November 2021
Flatiron-wide Algorithms and Mathematics Conference, Flatiron Institute	October 2021
SIAM Annual Meeting	July 2021
Center for Computational Mathematics Seminar, Flatiron Institute	April 2021
Center for Computational Quantum Physics Seminar for Simons Foundation Chair, Flatiron Institute	April 2021
Department of Theoretical Physics Seminar, Jožef Stefan Institute	March 2021
Center for Computational Quantum Physics Nonequilibrium Journal Club	March 2021
SIAM Conference on Computational Science and Engineering	March 2021
Flatiron-wide Algorithms and Mathematics Conference, Flatiron Institute	October 2020
Virtual Conference on Theoretical Chemistry (Poster)	July 2020
Numerical Analysis Seminar, Flatiron Institute	December 2019
International Conference on Applied and Industrial Mathematics, Valencia	July 2019
Applied Inverse Problems, Grenoble	July 2019
Workshop on Numerical Analysis of Partial Differential Equations, Universidad de Concepción	January 2019
Modeling and Simulation Group Seminar, Courant Institute	November 2018
Modeling and Simulation Group Seminar, Courant Institute	December 2017

Modern Advances in Computational and Applied Mathematics, Yale University (Poster) — June 2017

SULI Poster Session, Lawrence Berkeley National Laboratory — May 2013

SULI Poster Session, Lawrence Berkeley National Laboratory — December 2012

Professional activities

Minisymposium organizer: *Artificial boundary conditions for wave problems in unbounded domains*, Computational Methods in Applied Mathematics, TU Wien, Austria — August 2022

Minisymposium organizer: *Integral equation-based methods for the simulation of time-dependent systems*, SIAM Conference on Computational Science and Engineering — March 2021

Referee: SIAM Journal on Scientific Computing, Advances in Computational Mathematics, Journal of Scientific Computing.

Mentorship & teaching

Internship co-adviser for Nan Sheng, Flatiron Institute — Summer 2021

Master's thesis co-supervisor for Syrian Truong, University of Chicago — 2020

Organizer and research group meeting leader for the Applied Math Summer Undergraduate Research Experience program, Courant Institute — Summer 2018

Teaching assistant: Calculus I, New York University — Spring 2019

Grader: Scientific Computing, New York University — Fall 2015

Teaching assistant: Multivariable Calculus, Brown University — Spring 2011