

Joseph Kraisler

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Employment

Williams College , Assistant Professor of Mathematics	2026 - Present
Amherst College , Assistant Professor of Mathematics	2023 - 2026
Columbia University , Postdoctoral Research Scientist	2020 - 2023

Education

PhD University of Michigan , Mathematics	2014 - 2020
• Thesis Title: Transport and Localization of Light in Classical and Quantum Models	
BS Pennsylvania State University , Mathematics	2009 - 2013
• Physics Minor	

Research Interests

Applied Analysis, Partial Differential Equations, Quantum Theory, Dispersive estimates, Spectral Theory, and Wave Phenomena.

Publications

- Joseph Kraisler, Jeffrey Schenker, John C. Schotland "Dynamic One Photon Localization in a Discrete Model of Quantum Optics", SIAM Journal on Applied Mathematics [10.1137/21M1428315](https://doi.org/10.1137/21M1428315)  2026
- Erik Hiltunen, Joseph Kraisler, John C. Schotland, Michael I. Weinstein, "Nonlocal PDEs and quantum optics: band structure of periodic atomic systems", SIAM Journal of Mathematical Analysis [10.1137/25M1754959](https://doi.org/10.1137/25M1754959)  2026
- Joseph Kraisler, Amir Sagiv, Michael I. Weinstein "On the Time-decay of solutions arising from periodically forced Dirac Hamiltonians", Journal of Differential Equations [10.1016/j.jde.2025.113449](https://doi.org/10.1016/j.jde.2025.113449)  2025
- Joseph Kraisler, Amir Sagiv, Michael I. Weinstein "Dispersive decay estimates for Dirac equations with a domain wall", SIAM Journal of Mathematical Analysis [10.1137/23M1625378](https://doi.org/10.1137/23M1625378)  2024
- Erik Hiltunen, Joseph Kraisler, John C. Schotland, Michael I. Weinstein, "Nonlocal Partial Differential Equations and Quantum Optics: Bound States and Resonances", SIAM Journal of Mathematical Analysis [10.1137/23M158142X](https://doi.org/10.1137/23M158142X)  2024
- Joseph Kraisler and John C. Schotland, "Kinetic equations for two-photon light in random media", Journal Of Mathematical Physics [10.1063/5.0106535](https://doi.org/10.1063/5.0106535)  2023
- Joseph Kraisler, Wei Li, Kui Ren, John C. Schotland, Yimin Zhong, "Transport Models for Wave Propagation in Scattering Media with Nonlinear Absorption", SIAM Journal on Applied Mathematics [10.1109/TASC.2023.3340648](https://doi.org/10.1109/TASC.2023.3340648)  2023
- Joseph Kraisler and John C. Schotland, "Collective spontaneous emission and kinetic equations for one-photon light in random media", Journal Of Mathematical Physics [10.1063/5.0055171](https://doi.org/10.1063/5.0055171)  2022

- Jeremy G. Hoskins, Joseph Kraisler, and John C. Schotland, "Radiative transport in quasi-homogeneous random media", Journal of the Optical Society of America A [10.1364/JOSAA.35.001855](https://doi.org/10.1364/JOSAA.35.001855) [↗](#) 2018

Preprints

- Joseph Kraisler and Joonsoo Lee, "Kinetic equations for real scalar fields coupled to a continuum of atoms" 2024
[arXiv:2307.06499](https://arxiv.org/abs/2307.06499) [↗](#) Submitted to SIAM Multiscale Modeling and Simulation

Manuscripts in Progress

- M. Burak Erdogan, Joseph Kraisler and Amir Sagiv, "Dispersive Estimates for a Two-dimensional Dirac Equation in a Domain Wall" 2026
- Joseph Kraisler and Brian Pigott, "Effective Dynamics in Many-body Real Space Quantum Optics" 2026
- Sam Johar, Joseph Kraisler and Ryogo Katahira, "Bound States in Exactly Solvable Polaritonic Models" 2026
- Sam Johar and Joseph Kraisler, "Spectrum of the Harmonic Oscillator in Real Space Quantum Optics" 2026

Undergraduate Research

- SURF 2025 - Shannon Hugar '27, Sequoia Post-Leon '28, Rita Xing '28, Ethan Yoo '28 Summer 2025
– Ionization for a $1 + 1$ dimensional Dirac equation in a domain wall
- Greg Call Academic Interns - Sam Johar '27 and Ryogo Katahira '27 2025 - Present
– Analytically solvable models in one-dimensional quantum optics

Recent Talks and Conferences Attended

- Great Lakes Mathematical Physics Meeting (GLaMP) 2026 - University of Dayton June 2026
– *Dispersive Estimates for a 2D Dirac Equation with a Domain Wall*
- 2026 Spring Eastern AMS Sectional Meeting - Boston, MA April 2026
– Orthogonal Polynomials and Quantum Mathematics: *Dispersive Estimates for a 2D Dirac Equation with an Unbounded Domain Wall*
– Spectral Theory and Geometry in Mathematical Physics: *Dirac Points in Periodic Atomic Systems*
- Joint Mathematics Meetings (JMM) 2026 - Washington DC January 2026
– *Ionization of a Periodically Perturbed Dirac Equation*
- SIAM Conference on PDES (PDE25) - Pittsburgh, PA November 2025
– *Kinetic Equations for One and Two-Photon Light in Random Media*
- PDE Seminar - Brown University October 2025
– *Dispersive estimates for some periodically forced Dirac equations*
- Great Lakes Mathematical Physics Meeting (GLaMP) 2025 - University of Kentucky June 2025

- *Dispersive estimates for some periodically forced Dirac equations*
- SIAM Conference on Applications of Dynamical Systems (DS25) - Denver, CO May 2025
 - Recent Advances in Wave Propagation and Dispersive Dynamics: *Dispersive Estimates for a Dirac Equation with a Domain Wall*
 - Faculty Seminar - Williams College April 2025
 - *Real space quantum optics in periodic media*
 - Physics & Astronomy Colloquium - Amherst College April 2025
 - *Wave Phenomena and Real Space Quantum Optics*
 - 2025 Spring Eastern AMS Sectional Meeting - Hartford, CT April 2025
 - Orthogonal Polynomials and Related Topics in Analysis: *Real space quantum optics and periodic media*
 - Quantum Mathematics: *Dispersive estimates for a Dirac equation with a domain wall*
 - New England Dynamics Seminar (Fall 2024) - UMass Amherst November 2024
 - *Dispersive Estimates for a Dirac Equation with a Domain Wall*
 - 2024 SIAM Quantum Intersections Convening - Tysons, VA October 2024
 - Mathematics & Statistics Colloquium - UMass Lowell October 2024
 - *Real Space Quantum Optics in Periodic Media*
 - Spectral Analysis of Schrödinger Operators (ICERM) - Providence, RI August 2024
 - SIAM Conference on Material Science - Pittsburgh, PA May 2024
 - Math Colloquium - Amherst College February 2024
 - *Factoring Numbers Using Quantum Computers*
 - Applied Math Seminar - UMass Amherst November 2023
 - *Real Space Quantum Optics in Periodic Media*
 - Math Colloquium - Vassar College October 2023
 - *Topological Insulators and the SSH Model*
 - Mathematical Aspects of Condensed Matter Physics - ETH Zurich July 2023
 - Mathematical Physics and Operator Algebras seminar - Michigan State University April 2023
 - *Real Space Quantum Optics in Localized and Periodic Media*
 - Yale University - Applied Mathematics seminar December 2022
 - *Real Space Quantum Optics in Periodic Media and One-Dimensional Dirac Points*
 - 2022 Simons Collaboration on Extreme Wave Phenomena Based on Symmetries Annual Meeting October 2022