

# J. Clayton Peacock

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## Research Skills & Interests

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**Theoretical Condensed Matter Physics:** Quantum chaos and integrability; Non-equilibrium dynamics; Anderson and many-body localization; Disordered systems; Dissipative and driven systems

**Quantum Simulation Methods:** Tensor networks; Krylov subspace methods; Pauli string binary encoding; Global optimization; Sparse matrix methods; Quantum trajectories

## Education

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### New York University

New York, NY

Ph.D. Candidate in Physics, Center for Quantum Phenomena  
Advisor: Prof. Dries Sels

August 2020 – July 2026 (expected)

### University of Cincinnati

Cincinnati, OH

B.S. with honors in Physics, Mathematics, and Astrophysics (GPA 3.94/4.0)  
Advisor: Prof. Carlos J. Bolech

May 2020

## Research Experience

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### Graduate Student Researcher, Center for Quantum Phenomena

New York, NY

New York University, Department of Physics

August 2020 – Present

- Bounded the stability of a many-body localizing system to rare Griffiths regions using MPS time evolution
- Developed an understanding of integrability in Krylov space based on dimerization of the Lanczos coefficients
- Characterized the extended, critical, and localized regimes of the 3d Anderson model in Krylov space
- Compared effectiveness of Pauli string binary encoding against tensor networks for quantum dynamics
- Studied a dissipation-induced zeno transition using tensor networks and a quantum trajectories approach
- Explored how to generate analog Hawking radiation in a spin system, utilizing DMRG and MPS

### Undergraduate Student Researcher

Cincinnati, OH

University of Cincinnati, Department of Physics

August 2018 – May 2020

- Implemented a novel continuous Matrix Product State ansatz for mixtures of bosons and fermions
- With this ansatz, described the ground state phases of mixtures when the inter-species interaction is attractive

## Publications

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- *Anderson localization: A view from Krylov space*  
**J. Clayton Peacock**, Vadim Oganesyan, Dries Sels, Phys. Rev. B 113, 064204 (2026)
- *Quantum many-body simulations with PauliStrings.jl*  
Nicolas Loizeau, **J. Clayton Peacock**, Dries Sels, SciPost Phys. Codebases 54 (2025)
- *Many-body delocalization from embedded thermal inclusion*  
**J. Clayton Peacock**, Dries Sels, Phys. Rev. B 108, L020201 (2023)
- *Condensate States of Atomic Bose-Fermi Gas Mixtures*  
C. J. Bolech, **J. Clayton Peacock**, Aleksandar Ljepoja, J. Phys.: Conf. Ser. 2494 012015 (2023)
- *Quantum coherent states of interacting Bose-Fermi mixtures in one dimension*  
**J. Clayton Peacock**, Aleksandar Ljepoja, C. J. Bolech, Phys. Rev. Research 4, L022034 (2022)

## **Programming Experience**

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Julia: ITensors.jl, PauliStrings.jl, MPSKit.jl, KrylovKit.jl, NLOpt.jl, HDF5.jl

Python: Scipy, Numpy, Matplotlib

High-Performance Computing: SLURM, Linux

Other: Git, LaTeX

## **Awards & Honors**

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Henry M. MacCracken Fellowship (2020)

Phi Beta Kappa Society Member (2020)

MUSE Fellowship (2019)

Sigma Pi Sigma Member (2019)

Junior Achievement Award in Physics (2019)

Dean's Honors (2017 –2020)

National Merit Scholarship Finalist (2016)

## **Presentations**

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New frontiers in out-of-equilibrium quantum many-body dynamics, Max Planck Institute (Poster, 2025)

Instituto Superior Técnico Physics Seminar (Invited Talk, 2025)

American Physical Society March Meeting (Contributed Talk, 2024)

Quantum Science GRS/GRC (Poster, 2024)

American Physical Society March Meeting (Contributed Talk, 2023)

Aspen Winter Conference: Disorder and Quantum Phases of Matter (Poster, 2023)

American Physical Society March Meeting (Contributed Talk, 2022)

American Physical Society March Meeting (Contributed Talk, 2021)

Ohio Supercomputing Center's Autumn Statewide Users Group Conference (Poster, 2019)

## **Outreach and Service**

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Organizing Committee Member, Conference for Undergraduate Women and Gender Minorities in Physics (APS), New York University, NY 2025

Center for Quantum Phenomena Representative, GPHORCE, New York University 2023–2024

President of Society of Physics Students, University of Cincinnati, OH 2019

## **Teaching Experience**

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Undergraduate Statistical Physics TA, New York University 2022

Undergraduate Statistical Physics TA, New York University 2021

Calculus supplemental review session leader, University of Cincinnati 2018–2020

Math and Science Support Center Tutor, University of Cincinnati 2017–2019

Electricity and Magnetism TA, University of Cincinnati 2017

## **Languages**

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English (native), Portuguese (intermediate), Spanish (basic)