GreysonPotter

Quantum Computing Infrastructure Developer and Postdoctoral Researcher

contact

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programming

Python
Mathematica
Javascript
OCaml
C++
HTML + CSS

quantum computing

Qiskit
OpenQASM
IBM Quantum
Azure Quantum
Amazon Braket

interests

Game Design
Web Development
Project Euler
Hiking
Photography

website

gkpotter.com

github

github.com/gkpotter

employment

since 2024 **Quantum Computing Infrastructure Developer**, Danish e-Infrastructure Consortium, Technical University of Denmark — Odense, Denmark

Developing software for quantum computing infrastructure and collaborating with researchers on interdisciplinary projects to provide expert advice on leveraging quantum computing systems effectively.

since 2023 **Postdoctoral Researcher**, Centre for Quantum Mathematics University of Southern Denmark — Odense, Denmark

- **Advisor**: Jørgen Ellegaard Andersen
- **Topics**: Topological quantum field theory, topological quantum computing, and knot invariants
- **Grants**:
  - *Recursive and Exact New Quantum Theory (ReNewQuantum)* European Research Council (ERC) Synergy Grant
  - *New Structures in Low-dimensional Topology* Simons Foundation Collaboration
  - *Scalable Continuous Variable Cluster State Quantum Technologies (CLUSTEC)* Horizon Europe Grant
  - *Topological Photonic Quantum Computing and its Applications (TopQC2X)* Innovation Fund Denmark (IFD) Grant
- **Masters Students**: Aksel Vendelsøe "Quantum generative adversarial networks" (jointly supervised with Jørgen Ellegaard Andersen and Konstantin Wernli)

education

2023 **Ph.D. in Mathematics**, Boston University — Boston, MA

- **Advisor**: Takashi Kimura
- **Title**: "Topological recursion, quantum Airy structures, and the generalized volume conjecture"

2020 **M.A. in Mathematics**, Boston University — Boston, MA
Coursework focused on geometry and topology

2017 **B.A. in Mathematics**, *magna cum laude*, Columbia University — New York, NY
Minor in Philosophy

research interests

Topological Quantum Computing, Quantum Algorithms, Topological Quantum Field Theory, Topological Recursion, Knot Invariants, Complex Geometry, Computational Mathematics, Mathematics Education

research papers

2025 **"Quantum algorithms for computing knot invariants"** (in progress)
(Joint with Jørgen Ellegaard Andersen and Konstantin Wernli.)

2025 **"An algorithm for computing topological recursion via higher quantum Airy structures"** (in progress)
(Joint with Roderic Guigo Corominas and Takashi Kimura.)

2025 **"qairy -- a software package for computing topological recursion via higher quantum Airy structures"** (in progress)
Available at github.com/gkpotter/qairy.

2023 **"Topological recursion, quantum Airy structures, and the generalized volume conjecture"**
PhD thesis, Boston University

research talks and posters

2024 **"Computing Knot Invariants with Topological Recursion"** Budapest, Hungary
Lightning talk at Simons Foundation Collaboration on "New structures in low-dimensional topology" Summer School and Conference

2024 **"Andersen-Kashaev TQFT and Approximating the Tetrahedral Operator for Photonics Platforms"** Neuchâtel, Switzerland
CLUSTEC General Assembly

2023 **"Topological Recursion, Higher Quantum Airy Structures, and Knot Invariants"** Odense, Denmark
Centre for Quantum Mathematics Research Seminar

2023 **"Non-perturbative Topological Recursion and $\mathrm{SL}(2,\mathbb{C})$ Chern-Simons Theory"** Richmond, VA
Poster at Richmond Geometry Meeting 2023

2023 **"Non-perturbative Topological Recursion and $\mathrm{SL}(2,\mathbb{C})$ Chern-Simons Theory"** Boston, MA
New England Algebraic Topology and Mathematical Physics Seminar

2023 **"Hyperbolic Knot Invariants and the Volume Conjecture"** Boston, MA
BU Community Seminar

2022 **"Non-perturbative Topological Recursion and the Generalized Volume Conjecture"** Boston, MA
BU Geometry and Physics Seminar

2022 **"Computing Topological Recursion via Higher Quantum Airy Structures"** Otranto, Italy
Poster at TR Salento 2022

2022 **"Topological Recursion, the Catalan Numbers, and Mirror Symmetry"** Boston, MA
BU Community Seminar

2021 **"Graph Sums in Topological Recursion"** Boston, MA
BU Student Geometry Seminar

2021 **"Topological Recursion and Higher Quantum Airy Structures"** Boston, MA
BU Student Geometry Seminar

2021 **"Introduction to Topological Recursion"** Boston, MA
BU Student Geometry Seminar

leadership and experience

since 2023 **Associate, QPurpose** Odense, Denmark
Developing algorithms and software for clients in various industries, including finance and quantum computing. Working in small teams with fellow researchers, software developers, and student programmers. Leveraging techniques from advanced mathematics to develop classical, quantum-inspired, and fully quantum algorithms.

2021-2023 **Counselor, PROMYS Pathways** Boston, MA
Working in small groups with high school students from low-income and underrepresented backgrounds, guiding them through rigorous mathematical problem-solving activities both in an in-person summer day program and throughout the year in virtual meetings.

2021–2022 **President, BU Chapter of the American Mathematical Society** Boston, MA
Organized events to promote graduate student research and professional development including: BU Community Seminar, Distinguished Speaker Seminar, Workshops on Ph.D. Research Tools and Website Development, Panels on Summer Teaching and Applying to Jobs and Postdocs.

2021–2022 **Organizer, BU Student Geometry Seminar** Boston, MA
Organized semester-long weekly seminar on *Stacks and Moduli* and mini-courses on *Topological Recursion* and *Toric Varieties*.

2021 **T^2 (Teacher's Teacher), PROMYS for Teachers** Boston, MA
Worked in small groups with secondary school teachers in an intensive, exploratory, mathematical problem-solving summer course.

since 2019 **Mentor, Directed Reading Program, Boston University** Boston, MA
Working one-on-one with an undergraduate student each semester to guide them through an advanced math text and develop and present a talk on what they learned.

2014–2017 **Co-founder and Treasurer, CU Game Dev** New York, NY
Co-founded the Columbia University Game Design and Development club, which seeks to make game design more accessible through workshops, speaker events, and game jams.

2014 **Math Assessment Intern, New Classrooms** New York, NY
Provided feedback on assessments and worked to ensure that questions accurately assessed specific mathematical concepts (grades 6-8) in student-friendly language.

teaching

since 2023 **Lecturer and Course Organizer, University of Southern Denmark** — Odense, Denmark
- *Advanced Topics in Quantum Mathematics* (Fall 2023)

2018–2021 **Lecturer, Boston University** — Boston, MA
- MA 511 *Introduction to Real Analysis* (Summer 2021)
- MA 412 *Complex Variables* (Summer 2020)
- MA 225 *Multivariable Calculus* (Summer 2018)

2017–2023 **Teaching Assistant, Boston University** — Boston, MA
- MA 412 *Complex Variables* (Spring 2022)
- MA 226 *Differential Equations* (Summer 2020)
- MA 225 *Multivariable Calculus* (Fall 2018)
- MA 124 *Calculus II* (Spring 2019, Fall 2019, Spring 2021, Fall 2022)
- MA 123 *Calculus I* (Fall 2021)
- MA 122 *Calculus II for Social Sciences* (Spring 2020)
- MA 121 *Calculus I for Social Sciences* (Spring 2018)
- MA 120 *Introduction to Applied Math* (Fall 2017)
- CS 132 *Geometric Algorithms* (Fall 2020)

2014–2017 **Teaching Assistant, Columbia University** — New York, NY
- MATH 2010 *Linear Algebra* (Fall 2015, Spring 2016)
- MATH 1204 *Calculus IV* (Spring 2015)
- MATH 1201 *Calculus III* (Fall 2014, Fall 2016)
- MATH 1102 *Calculus II* (Spring 2017)

workshops

since 2023 **Simons Foundation Collboration Meetings** — Various Locations
Funded to participate in various workshops and conferences as part of the Simons Foundation Collaboration "New Structures in Low-Dimensional Topology" in Belalp, Switzerland, Princeton, NJ, New York, NY, and Budapest, Hungary.

2021, 2022 **TR Salento** — Otranto, Italy
Funded to participate in the topological recursion two-week summer school and workshop, collaborating with graduate students, postdocs, and professors to study the relationship between topological recursion and integrable systems, cohomological field theories, resurgence, enumeration of maps, and Hurwitz theory.

2021, 2022 **BU-Keio-Tsinghua Workshop** — Boston, MA
Participated in the joint workshop between Boston University, Keio University (Yokohama, Japan), and Tsinghua University (Beijing, China), which focused on geometry and mathematical physics.

2019 **MSRI Graduate Summer School** — Berkeley, CA
Funded to participate in the *Representation Stability* summer school the Mathematical Sciences Research Institute, collaborating with graduate students, postdocs, and professors to study the algebraic structural properties and stability phenomena exhibited by sequences of representations of groups.

2015–2017 **Math Summer Research Program, Columbia University** — New York, NY
Funded to conduct research in both the *Spectral Graph Theory, Markov Chains, and the PageRank Algorithm* group and the *Constructions and Obstructions of Symplectic Embeddings* group.