

Noah Ringrose

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Research Interests

Topological quantum field theory, generalized symmetries and topological defects in QFT and lattice models, classification of topological phases of matter, (higher) tensor categories.

Education

New York University

PhD in Physics

August 2025 (Incoming) –

Pennsylvania State University, Schreyer Honors College

BS in Mathematics (Honors) and Physics

August 2021 – May 2025

- **Thesis:** *Higher Structures from Simple Lattice Models*
- **Advisor:** Adrian Ocneanu
- **Graduate Level Coursework:** Quantum Field Theory I & II, General Relativity, Loop Quantum Gravity, Algebraic Topology, Differentiable Manifolds, Higher Representation Theory I & II, Algebraic Geometry II
- **GPA:** 3.99/4.00

Research Experience

The Ohio State University, Researcher in ROMUS Program

May 2024 – August 2024

- Under the supervision of David Penneys and Kyle Kawagoe, I researched the relations between Levin-Wen string net systems coming from unitary fusion categories and anyons in $2+1$ dimensional topological phases of matter.
- Discovered the first unitary movement operators in the specific case of Kitaev's quantum double model which move anyons regardless of their type.
- Utilized these operators to develop a new method of computing data corresponding to braided fusion categories.

Institute for Advanced Study, Park City Mathematics Institute

July 2023 – August 2023

- One of thirty undergraduates from all over the world to be invited to attend daily lectures by renowned faculty on quantum information theory, focusing particularly on quantum algorithms.
- Participated in problem solving sessions and informal events alongside research faculty, graduate students, and undergraduate students
- Investigated the theory of billiard dynamics on Veech surfaces for three weeks. Together with a group of other undergraduates, we computed the number of holonomy vectors that corresponded to saddle connections on the double pentagon, within a ball of radius R .

Polymath Jr., Remote Researcher

June 2023 – August 2023

- Researched combinatorial representation theory, specifically solvable lattice models, which find their origin in problems related to statistical mechanics. I worked under the supervision of Ben Brubaker from the University of Minnesota.
- Attempted to represent Hecke-Grothendieck Polynomials via a family of solvable lattice models and their associated R-Matrices and Boltzmann Weights.
- Employed the use of SageMath and Mathematica to compute partition functions and solve for R-Matrices using the Yang Baxter Equation.

Talks and Presentations

**AMS Contributed Paper Session on Topics in Mathematical Physics,
Joint Mathematics Meetings 2025**

January 10, 2025

Generalized Movement Operators for Non-Abelian Anyon Theories

Young Mathematicians Conference

August 15, 2024

Generalized Movement Operators for Non-Abelian Anyons

Honors and Awards

John and Elizabeth Holmes Teas Scholarship
Scholarship

Eberly College of Science
September 2024 - Present

- Awarded \$24,400 for the 2024-2025 academic year on account of academic excellence and contributions to the physics community.

Elsbach Honors Physics Scholarship
Scholarship

Schreyer Honors College
August 2022 - May 2024

- Awarded \$12,000 over two years for outstanding performance as an honors physics student

Sigma Pi Sigma
National Physics Honors Society

American Physical Society
March 2022 - Present

- Inducted into the PSU chapter of Sigma Pi Sigma as a freshman

Teaching Experience

Prep Expert
Private Tutor

Remote
March 2022 - May 2024

- Tutored high school students in standardized tests and math/physics courses, specifically focusing on AP Calculus, AP Physics, and the SAT.
- Coordinated with parents to come up with lesson plans for students, schedule meetings, and discuss progress.