Jay Epstein

University of Toronto: Physics Specialist; Mathematics Major (4th year)
310 Bloor Street West
Toronto, ON M5S 0C4
(470)-265-5591
Student ID: 1006684198
jaydepstein@gmail.com

Education

University of Toronto, Toronto - *Physics Specialist; Math Major*

September-2020 - Present

- Sample of Courses:
    - Proof-based mathematics: Advanced Calculus, Introduction to Abstract Mathematics, Complex Variables
    - Physics: Advanced Classical Mechanics, Relativistic Electrodynamics, General Relativity, Quantum Field Theory. Classes have included both theoretical and lab components.
    - Extra: Principles of Microeconomics, Mathematical Expressions and Reasoning for Computer Science
- GPA: 3.78

Additional Academic Training

PSI START, Perimeter Institute for Theoretical Physics, Waterloo

May-2022 - July 2022

- 10 week online summer school comprised of 50 invited undergraduate students
- Topics include path integrals, symmetries, and relativistic quantum mechanics

International Summer School for Young Physicists (ISSYP), Perimeter Institute for Theoretical Physics, Waterloo

- Participated in mentor sessions under the supervision of a Perimeter faculty researcher on the topic of the Holographic Principle involving intensive studying on challenging concepts such as AdS/CFT Correspondence and string theory and provided a presentation.

Colloquia/Conferences

- Attended various colloquia and conferences at Perimeter Institute and the University of Toronto, including but no limited to:
    - “From wave function collapse to non-abelian anyons on a quantum processor”, Ruben Veressen

- “Scalar fields in strong gravity: black holes, neutron stars and wormholes”, Georgios Antoniou
- QFT for Mathematicians 2022
- Various seminars in asymptotic safety

Research Experience

PSI START, Perimeter Institute for Theoretical Physics

Supervisors: Benjamin Knorr, Alessia Platania

May-2022 - August 2022

- Utilized functional renormalization group techniques to study asymptotically safe gravity, specifically renormalization group flows of effective average action gravity ansatzes in the minisuperspace approximation

Perimeter Institute for Theoretical Physics, Lightcone Group

Supervisor: Ding Jia

July -2022

- Analyzed the light cone structure of simplicially-discretized 2 + 1 spacetime to systematically find non-physical spacetime configurations (simplicial geometries with irregular light cone structure) with the ultimate goal of facilitating path integrals over spacetime configurations by neglecting the non-physical configurations

Emory University

Supervisor: Wladimir Benalcazar

July -2023 - August 2023

- Worked on analyzing the duality between the 1D transverse Ising model and the Kitaev chain model, related by the Jordan-Wigner transformations. I additionally recreated results in early sections of the paper “Z2 Topological Order and Topological Protection of Majorana Fermion Qubits” (Ul Haq, Kauffman)

Skills

LaTeX

Teaching/tutoring

Projects

Quantum Field Theory notes/solutions

- Type-set expansion of notes from a past graduate course in quantum field theory as well as contributions from other texts, plus original solutions to problems from various sources

Personal website (x32vertigo.github.io)

- Collection of past research/passion projects (including quantum field theory notes/solutions) and full academic history

Awards

2021 Canadian Association of Physicists (CAP) University Prize Exam - 8th place (1st year student)

Science Olympiad

- National Science Olympiad Competition individual medal (5th place)

National Advanced Placement (AP) Scholar

Congressional Award - US Congress award for youth and young adults for participation in public service - Gold medal (400+ hours of volunteer service)

Volunteered in variety of settings, including but not restricted to:

- Create Your Dreams; summer program volunteer mentor for at-risk youth
- Furkids; long-term volunteer supporting welfare and adoption of rescue cats
- Pinch Hitters; substitute for kitchen staff at VA hospital during holidays

USA Physics Olympiad Competitor