

Jianming Zheng

Tsinghua University, Beijing, 100084, P.R. CHINA
zhengjm314@gmail.com or zhengjm21@mails.tsinghua.edu.cn

EDUCATION

Bachelor of Science

September 2021 - July 2025(expected)

Department of Physics, Tsinghua University, GPA: 3.81/4.00

SKILLS AND INTERESTS

Interests

I'm interested in quantum gravity and quantum field theory, with a current focus on quantum information theoretic aspects of quantum gravity and quantum chaos in gravitational systems. I'm also interested in the duality between matrix models and gravity theories.

Relevant coursework

Classical Mechanics, Electrodynamics, Statistical Physics, Quantum Mechanics, General Relativity, Quantum Field Theory, Gauge Theory, Finite-temperature Field Theory, String Theory, Quantum Information and Quantum Gravity, Conformal Field Theory.

PROJECTS

Channel capacity of a traversable wormhole

October 2023 - Present

- Under the instruction of Zhenbin Yang, Tsinghua University.
- Learned the setup of a traversable wormhole and the method to quantify the capacity of a quantum channel. Especially trying to understand how the traversable wormhole works as a special quantum teleportation protocol.
- Obtained the coherent information with a gravitational calculation using the replica trick in Jackiw-Teitelboim gravity and checked the regime where the saddle point calculation is valid.
- Checked the replica result of the coherent information using a RT calculation.
- Working to understand the additivity of the coherent information of the traversable wormhole.

String worldsheet description of matrix models

April 2024 - Present

- Under the instruction of Professor Mukund Rangamani, University of California, Davis.
- Learned the large N limit of quantum field theories, and how to calculate correlation functions in matrix models.
- Learned how the lower dimensional Yang-Mills theory goes to a string theory in the large N limit and the worldsheet description of the string theory.
- Trying to generalize the string worldsheet method to the calculation of more general observables in matrix models.

EXTRA-CURRICULAR

- Reading club on string theory, Qiuzhen College, Tsinghua University. Spring, 2024
- Reading club on *Quantum Signatures of Chaos*, Institute of Advanced Study, Tsinghua University. Autumn, 2023
- Reading club on *Aspects of Symmetry*, Department of Physics, Tsinghua University. Spring, 2023
- Reading club on *Light Rays, Singularities, and All That*, Department of Physics, Tsinghua University. Autumn, 2023

ACHIEVEMENTS

- Tsinghua Xue Tang scholarship Autumn 2023
- Scholarship for Innovation in Science and Technology Autumn 2023
- Selected in the written test for the final review of S.-T. Yau College Student Mathematics Contest May, 2023
- Scholarship for Academic Progress Autumn 2022

DECLARATION

I hereby declare that all the details furnished above are true to the best of my knowledge and belief.