Jianming Zheng

+8618001307446 | zhengjm314@gmail.com
Tsinghua University, Beijing, 100084, P.R China

Education

- **Tsinghua University** *September 2021 - July 2025 (expected)*
  Bachelor of Science Beijing, P.R China
  - GPA: 3.83/4.00
  - **Relevant Graduate Courses:** General Relativity, Quantum Field Theory, Gauge Theory, String Theory, Finite-Temperature Field Theory, Theoretical Topics in Particle Cosmology, Quantum Gravity and Quantum Information (A+), Topics in Field Theory and Condensed Matter, Conformal Field Theory (A+), Quantum Computation.

Projects

- **The Supersymmetric Virasoro Minimal String** *July 2024 - Present*
  Advisor: Mukund Rangamani
  - Learned how to bootstrap the structural constants of Liouville theory and continued the structural constants of $\mathcal{N}=1$ Liouville theory to central charge $c \leq \frac{3}{2}$;
  - Calculated the worldsheet amplitude of the supersymmetric Virasoro minimal string;
  - Bootstrapped the modular crossing kernel of $\mathcal{N}=1$ superconformal blocks and obtained the universal Cardy density of states. Matched the results from worldsheet perturbation theory and the corresponding matrix integral;

- **Quantum Channel Capacity of Traversable Wormholes** *November 2023 - Present*
  Advisor: Zhenbin Yang
  - Calculated the coherent information of the traversable wormhole channel using replica trick and quantum RT formula separately in JT gravity;
  - Argued that the system saturates the Bekenstein bound at leading order and found that the coherent information is related to the time derivative of out-of-time-ordered correlators (OTOC);
  - Investigated corrections from string scattering, flavors of the probe particles and robustness to noises created by local operators on the boundary. We explicitly showed that the information transfer is bounded by the double-trace coupling g.

- **Inflation Correlators with Massive Exchanges** *May 2023 - September 2023*
  Advisor: Zhong-Zhi Xianyu
  - Learned how to calculated correlation functions of primordial non-Gaussianities diagrammatically using Schwinger-Keldysh path integral;
  - Attempted to calculate correlation functions with multiple massive exchanges using momentum space correlators of quasi-primary operators arising from the late-time expansion of field operators in de Sitter spacetime.

Publications

Honors and Awards

- **Chi-Sun Yeh Scholarship, Member of the Tsinghua Xuetang Talents Program** *October 2023*
  Department of Physics,Tsinghua University
  - A scholarship for students with outstanding motivation and abilities to study physics.

- **Excellence in the Written Test of S.-T. Yau College Student Mathematics Contest** *May 2023*
  Qiuzhen College, Tsinghua University [🌐]
  - One of the most important mathematical contests for college students in China initiated by Prof. Shing-Tung Yau. The syllabus of the test in the mathematical physics track includes advanced quantum mechanics, quantum field theory and general relativity.

- **Scholarship for Innovation in Science and Technology** *October 2024*
  Department of Physics, Tsinghua University
  - This is a scholarship for students who excel in scientific research and competitions.

EXTRA-CURRICULAR

- **Reading club on *Quantum Signatures of Chaos*** *October 2023 - June 2024*
  Institute of Advanced Study, Tsinghua University.
  - We discussed some aspects of quantum chaos of random matrix theory, with a focus on topics which can be applied to quantum gravity;
  - I gave several presentations on (non-) perturbative calculations of spectral observables in random matrix theories.

- **Reading club on string theory** *March 2024 - May 2024*
  Qiuzhen College, Tsinghua University
  - We discussed topics on D-branes and RNS formalism of superstring theory.

- **Reading club on *Aspects of Symmetry*** *March 2023 - June 2023*
  Department of Physics, Tsinghua University.
  - We discussed the book *Aspects of Symmetry* by Sidney Coleman, mainly on renormalization group flows, instantons and large N methods in gauge theory;
  - I gave several presentations on conformal invariance and renormalization group flows.

- **Reading club on *Light Rays, Singularities, and All That*** *September 2024 - November 2024*
  Department of Physics, Tsinghua University.
  - We discussed the lecture note *Light Rays, Singularities, and All That* by Edward Witten, on the causal structures in general relativity;
  - I gave several presentations on causal curves, null geodesics and singularity theorem.