Xinran Su

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Education

Sun Yat-Sen University *Sept 2022 – June 2026*
Undergraduate Student in School of Physics

- GPA: 3.9/5.0
- Core Coursework: Linear Algebra (98), Programming (96), Group Theory in Physics (98), Quantum Field Theory (98), General Relativity(91), Electrodynamics (93), Advanced Quantum Mechanics (92)
- Leadership: Monitor of National Basic Subject Talent Training Plan 2.0 class; Vice President of the Society of Physics Students at Sun Yat-sen University; Committee Member of Torchwood Physics Club

Research Experience

Bootstrapping Yang-Mills Matrix Model *Sun Yat-sen University*
Advisor: Prof. Wenliang Li *September 2023 – Present*

Current Progress

- Generalized the computation of first-order $1/D$ corrections from words of length 2 and 4 to arbitrary word lengths, and derived general analytic expression valid for all lengths of various types of words. Then discovered analytic ansätze for the eigenvalue density of singlets and other types of words.
- Applied irreducible representation decomposition to simplify semi-definite matrices in the positivity bootstrap, and obtained upper and lower positivity bounds up to length 12.

Bootstrapping Hoppe model *Perimeter Institute*
Advisor: Prof. Pedro Vieira, Harish Murali *August 2025 – Present*

Research Purpose

- Develop a new bootstrap method applicable in the strong coupling regime $g \to \infty$, with the goal of reproducing and extending the perturbative results for the Hoppe model.

Bootstrapping a Hamiltonian Related to the Riemann Zeta Function *Perimeter Institute*
Advisor: Dr. Zechuan Zheng *July 2025 – Present*

Research Purpose

- Apply the bootstrap approach to a Hamiltonian conjectured to be related to the nontrivial zeros of the Riemann zeta function. The goal is to explore whether the eigenvalues of the Hamiltonian is real, which would imply the Riemann Hypothesis.

Honors And Awards

The First Prize Scholarship, Sun Yat-Sen University *December 2024*

Xu Chongqing President's Scholarship, Sun Yat-sen University *December 2024*

The Second Prize Scholarship, Sun Yat-Sen University *December 2023*

The 14th China Undergraduate Physics Tournament, Third Prize *August 2023*

- Contributed to the fluid dynamics and acoustics section of the Sun Yat-sen University team. Modeled the perforated tea strainer using COMSOL, analyzed vibration modes, and conducted experimental validation with Adobe Audition and MATLAB for frequency domain analysis.

Skills

Languages: Mandarin (Native), English (CET6: 566, TOEFL iBT: 100 (R29, L27, S22, W22))

Technologies: Mathematica, C++, LaTeX, Python, MATLAB