

YUNTAI SONG

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🐙 github.com/wwhd222

🌐 [Yuntai Song](#) | [LinkedIn](#)

EDUCATION

Lanzhou University

Bachelor of Science in Theoretical Physics

GPA: 3.94/4.00 | 93.29/100.00 | Ranked 1/66 in Theoretical Physics | Top 1%

Sep. 2020 – Jun. 2024

Lanzhou Gansu, China

University of California, Riverside

Visiting Student

Sep. 2023 – Jun. 2024

Riverside California, USA

University of Illinois Urbana-Champaign

PhD Student in Physics

Aug. 2024 – Jul. 2029(expected)

Champaign Illinois, USA

RESEARCH EXPERIENCE

[1] Emergent Long- Range Interaction in Entanglement Hamiltonian

Jul. 2023 – Sep.2023

Instructor: Prof. Zheng Yan

Hangzhou, China

- Made exact diagonalization approach to 1D Heisenberg Ladder system.
- Extracted the strength of Heisenberg operator with different interacting distance in the entanglement Hamiltonian to argue for the violation of Li- Haldane conjecture.

[2] Neural Quantum State Ansatz for Variational Monte Carlo Method

Aug. 2023 – Apr. 2024

Instructor: Prof. Yizhuang You

Remote

- Used restricted Boltzmann machine ansatz for VMC to calculate the ground state of several spin models- transverse Ising model, Kitaev honeycomb model with magnetic field, etc.
- Used convolutional neural network (CNN) and group convolutional neural network (GCNN) ansatz for VMC to calculate the ground state of frustrated spin models, like $J_1 - J_2$ model.
- Project Summary: Neural Quantum States in Variational Monte Carlo Method: A Brief Summary

[3] Maximum-likelihood Decoder for Stabilizer Codes

Nov. 2023 – Present

Instructor: Prof. Leonid Pryadko

Riverside, USA

- Developed Monte Carlo method for decoding process in quantum error correction.
- Used Bennett acceptance ratio method to find the logical sector with lowest free energy.
- Ongoing project: vecdec: vectorized decoder and LER estimator

[4] Chiral Topological Order as Approximate Quantum Error Correction Code

Nov. 2024 – Present

Project Leader: Dr. Bowen Shi

Champaign, USA

- Investigated the quantum information properties of fractional quantum Hall systems.
- Used quantum Monte Carlo method, matrix product state (MPS) to derive von-Neumann coherent information (flagged and unflagged error channel) and Rényi-2 coherent information.
- Ongoing project: draft available.

Positions

Summer Research Assistant, School of Science, Westlake University

Jul. 2023 – Sep.2023

Graduate Teaching Assistant, Physics, University of Illinois Urbana Champaign

Aug. 2024 – Present

SKILLS

Programming Languages and Frames: Matlab, C and C++, Python, Mathematica, \LaTeX , Jupyter Notebook

Scientific Software: OriginLab, VESTA