Junwen Luo

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Education

Sun Yat-sen University — Guangzhou, China
Master of Science in Physics — *Sep 2022 – Jun 2025*

Beijing University of Chemical Technology — Beijing, China
Bachelor of Engineering in Electronic Science and Technology — *Sep 2018 – Jun 2022*

Research Interest

Quantum Optics, Open Systems, Superradiant Phase Transitions, Waveguide QED, Quantum Information.

Research Experience

Quantum Phase Transitions in Light-Matter Interaction Systems — Sep 2023 – Jan 2025
Supervisor: Prof. Ze-Liang Xiang, Sun Yat-sen University

- Investigated superradiant phase transitions in a Dicke trimer model with both photon and atom hoppings
- Employed the mean-field method to identify the critical points from excitation spectrum, and determined the system's ground-state configuration analytically by using the Cauchy-Schwarz inequality and monotonic method
- Derived an exotic phase diagram and analyzed unique phenomena arising from the interplay between hoppings, including a sequence of transitions across three distinct phases.

High-fidelity Quantum Gates Based on Hybrid Systems — Sep 2021 – Mar 2023
Supervisor: Prof. Guanyu Wang, Beijing University of Chemical Technology

- Developed a method for constructing high-fidelity quantum logic gates in photon-Quantum Dot hybrid systems
- Proposed two detail schemes for implementing both Toffoli and Fredkin gates using photon scattering
- Designed compact quantum circuits with no auxiliary qubits, enhancing experimental feasibility for practical quantum computing tasks.

Publications

Jun-Wen Luo, Bo Wang and Ze-Liang Xiang†, *Quantum phase transitions in a Dicke trimer with both photon and atom hoppings*, arXiv:2502.10839 (2025).

Jun-Wen Luo and Guan-Yu Wang†, *High-fidelity universal quantum gates for hybrid systems via the practical photon scattering*, Chinese Physics B, 32(3), 030303 (2023)..

Honors

First Class Scholarship for Postgraduate Students
Sun Yat-sen University — *2023*

Second Class Scholarship for Postgraduate Students
Sun Yat-sen University — *2022,2024*

Language and Skills

Programming Languages: Mathematica, Matlab, Python
IELTS: 6.5
Other: LaTeX