Liu Xiang

Curriculum Vitae

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Objective

Seeking a Ph.D. position in Condensed Matter Physics, with a focus on theoretical and numerical studies of the low-dimensional nanostructures, 2D materials, strongly correlated electron systems, quantum many-body physics and quantum optics.

Education

2022 – present **M. S. in Theoretical Physics**, *Central South University (ARWU 94)*, Changsha, China, **GPA: 3.83/4**.

Research Focus: Strong correlated electrons, Low-dimensional nanostructures, Quantum optics model, 2D materials.

2018 – 2022 **B. Sc in Applied Physicsz**, *Xi'an Polytechnic University*, Xi'an, China. **GPA: 86.8/100 Rank: 2/47.**

Bachelor Thesis: Study of Critical Exponents in the Transverse-Field Ising Model.

Publications

2024 **Xiang Liu**, Zheng Tao, Wenchen Luo, and Tapash Chakraborty.

Interlayer excitons in double-layer transition metal dichalcogenides quantum dots.

Phys. Rev. B 111, 085424.

2024 Wenchen Luo, Muaath Abdulwahab, **Xiang Liu** and Hao Wang.

$\frac{5}{2}$ *fractional quantum Hall state in GaAs with Landau level mixing.*

Phys. Rev. B 110, 085428.

2024 Wenna Zhang, Yutao Hu, Hongyi Zhang, **Xiang Liu**, Georgios Veronis, Yuecheng Shen, Yin Huang, and Wenchen Luo.

Skin effect in Non-Hermitian systems with spin. ***arXiv*:2408.07406.**

Submitted to Phys. Rev. B, Status: With referee.

2025 **Xiang Liu** and Wenchen Luo.

Effects of Quantum Confinement and Coulomb Interactions in TMD Quantum Dots. **Invited Review Article, Physica E, In preparation**.

Research Interests

Quantum Dot Investigated the electronic states of QD, from single-electron to many-electron systems, with a focus on the spin-orbit coupling, impurities, etc.

Strongly Correlated Systems Explored Coulomb interactions in few-body systems within low-dimensional nanostructures. Experienced in quantum many-body spin systems, focusing on phase transitions and critical phenomena in models like the Ising model.

2D Materials Explored electronic transport and valley physics, particularly exciton in TMDs, focusing on twist angles and the unique properties of bilayer systems.

Quantum Optics Model Investigation of quantum Rabi models, JC models, and Dicke models, focusing on their unique physical properties and light-matter interactions within quantum solid-state nanostructures systems.

Numerical Techniques Implemented efficient numerical methods across multiple programming languages, utilizing a 700-core CPU cluster for parallel computing and exploring GPU-based techniques to optimize performance.

Awards and Honors

2022 – 2024 ○ Graduate Study Scholarship, CSU (Three times)

Sep 2022 ○ China Recommended Exemption Graduate Students Scholarship

Jul 2022 ○ Excellentt Undergraduate Graduate Award

Dec 2020 ○ The Chinese Mathematics Competitions of Shaanxi Province, First Prize

2018 – 2022 ○ Outstanding Student Scholarship, XPU (Three times)

Talks and Conference Participation

Jul 2024 *Interlayer excitons in double-layer transition metal dichalcogenides quantum dots. Hunan Province Symposium on the frontiers of Physics Hengyang, China.* ***Invited Talk***.

Dec 2023 *Hunan Province Annual Physics Conference, Xiangtan, China.*

Aug 2023 *Chinese Physical Society Fall Meeting, Yinchuan, China.*

May 2023 *The 2rd Symposium on Fractional Quantum Hall Effect, Chongqing, China.*

Computer Skills

Keen on programming and optimizing computational efficiency across various languages.

- Matlab, Fortran, Mathematica, Python, Bash
- Linux, COMSOL, LaTeX
- Notion, Adobe Illustrator, Microsoft Windows, Origin

Languages

- Chinese: Native language
- English:TOEFL iBT 73(Retaking soon).

Hobbies

- Musics
- Coding
- Movie
- Badminton