

Changjiang Wu

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EDUCATION

University of Massachusetts Amherst|Amherst, MA **Sep 2025-Present**

- Ph.D. Candidate in Physics (expected graduation: May 2029)
- Cumulative GPA in General: 3.58/4.0

Renmin University of China|Beijing, China **Sep 2021-Jun 2024**

- Master of Science in Theoretical Physics (confirmed)
- Cumulative GPA in General: 3.15/4.0

Renmin University of China|Beijing, China **Sep 2017-Jun 2021**

- Bachelor of Science in Physics (confirmed)
- Cumulative GPA in General: 3.18/4.0

Honors and Awards:

- MSE IDGP Doctoral Fellowship, University of Massachusetts Amherst Mar 2026
- College of Science “Rising Academic Star” Award 2024, Renmin University of China Jun 2024
- Outstanding Graduate of Renmin University of China 2024 Mar 2024
- Merit Student Award, Renmin University of China Sep 2023
- College of Science Book Club Award of Excellence, Renmin University of China May 2020

PUBLICATION

- Chang-Jiang Wu, Jian-Feng Zhang, Pei-Han Sun, Huan-Cheng Yang, Zhong-Yi Lu, and Kai Liu, Thickness-dependent oscillation of the superconducting T_c in ultrathin NbC films: A first-principles study. **Phys. Rev. B** **108**, 115161 (2023).
- Ke-Xin Xu, Xin Du, Hui-Hui He, Guo-Zhao Xu, Jian-Feng Zhang, Chang-Jiang Wu, Wei Zhang, Zhong-Yi Lu, and Kai Liu, Superconductivity in monolayer YCI and its strain modulation: A first-principles prediction. **Comput. Mater. Sci.** **258**, 113986 (2025).
- PQMO: a Versatile and Automated High-Throughput Platform for First-Principles Calculations across Multiple Software Packages (**Manuscript**)

RESEARCH EXPERIENCE

PQMO: a Versatile and Automated High-Throughput Platform for First-Principles Calculations across Multiple Software Packages March 2023-June 2024

Leading member in Physical Laboratory of High Performance Computing, Supervised by Professor Liu Kai (<https://orcid.org/0000-0001-6216-333X>) and ZhongYi Lu(<https://www.researchgate.net/profile/Zhong-Yi-Lu>)

General Description

PQMO aims to streamline and automate the execution of first-principles simulations across various software applications on high-performance computing clusters. Our goal is to provide a convenient solution for integrating multiple calculations and support efficient large-scale computations. The robust framework accelerates research workflow by simplifying and standardizing the process of material modeling and further laying a solid foundation for advanced high-throughput research.

- Analyzed and explored the initial blueprint provided by the advisor, developed the first version of the project program, and was responsible for optimization;
- Responsible for the architectural design of the entire experimental program, functional implementation, as well as the structure and format design of configuration files;
- Implemented detailed code annotation, refactored the framework of the extended version, defined the software’s adaptation interface and other interfaces, completed the standardization of the adaptation interface from abstract logic, as well as experimenting with the software in the production environment;
- Used Git/Github for code organization and wrote a description of the program’s goal, usage, and version changelog, summarized the software usage and program for potential users and authored a detailed user manual of the program, which can be extended to multiple language versions.

- Enhanced my ability to build large software projects, shorten the tedious part of simulations with the framework, and increase my understanding of high-throughput computing.

Thickness-dependent oscillation of the superconducting T_c in ultrathin NbC films: A first-principles study

Sep 2021-Aug 2023

Leading member in Quantum Material Simulation Laboratory, Supervised by Professor Liu Kai

(<https://orcid.org/0000-0001-6216-333X>) and ZhongYi Lu(<https://www.researchgate.net/profile/Zhong-Yi-Lu>)

General Description

Our research explores the dimensionality effect on superconductivity through first-principles studies of ultrathin NbC films. We discovered a remarkable thickness-dependent oscillation in the superconducting transition temperatures(T_c), with amplitude up to 10 K. Our analysis reveals that films exhibiting higher superconducting T_c demonstrate significant phonon softening and enhanced electron-phonon coupling on specific high-symmetry points. This study provide an insight for the influence of reduced dimensionality on superconducting properties.

- Responsible for all calculations and validity check to the experimental for the project. This includes modeling actual materials, conducting comprehensive first-principles calculations, verifying the accuracy of calculations, and comparing the results with experimental data.
- Worked on modeling multiple 2D material systems, verifying their basic properties, and confirming the behavior of superconducting T_c singular oscillations within these systems.
- Revealed the causes of the oscillations by analyzing physical properties and coherent it with the BCS theory framework. Among this progress, We use multiple calculations to supporting our physical model, such as calculating vibrational modes, Fermi surface nesting, charge density distribution, k space-resolved electron-phonon coupling constants, differential charge density, electron local function distribution;
- Conducted literature searches and investigations and wrote the thesis for the project, including as completing the first draft of the thesis, including title, abstract, introduction, and any other sections, using LaTeX formatting thesis and citation of related references from literature research. Carefully prepared the figures and captions to enhance the thesis' clarity.

OTHER PROJECTS WORTH MENTIONING

- **June 2017-Present, Academic Explorer. Implemented various classic computational algorithms using Python, MATLAB, C, and other widely used languages.** Some examples include the Runge-Kutta method, Random Forest algorithm, Conjugate Gradient method, SVD decomposition, Householder transformation, Metropolis algorithm, 2D ising model critical point computation, Simulated annealing algorithm, and many others. Maintained scripts for several of these classic algorithms to date.
- **June 2017-Present, Academic Explorer. Translated physical formulas into practical programs for scientific research:**
 - ❖ A program for accelerating high-throughput calculations and structural searches under specific pressures.
 - ❖ A program for calculating the distribution of electron-phonon coupling strengths with phonon modes and k space-resolved.
 - ❖ A program for calculating the displaced lattice structure of atoms vibrating away from their equilibrium position for a particular vibrational mode.
 - ❖ A program for calculating the imaginary part of the electron susceptibility, which characterizes the magnitude of the Fermi nesting function.

SKILLS

- ❖ **Programming Languages:** Shell, Fortran, Python, Rust, TypeScript, AWK, MATLAB
- ❖ **Programming Libraries:** NumPy, Pandas, Matplotlib, MPICH/OpenMPI
- ❖ **Programming Toolkit:** Git, Vim, Linux, Quantum ESPRESSO/VASP/CASTEP, Conda, TEX&LATEX, PBS/SLURM
- ❖ **Language:** Mandarin (Native language), English (Fluent)
- ❖ **Interests:** Photography, Programming, Cooking, Philosophy, Computer and server maintenance, and Open source software development