

# Kaiming Liu

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## EDUCATION

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*Sept 2017 – Jul 2023 (expected)*

**Xi'an Jiaotong University (XJTU)** | Xi'an, P.R.China

*Sept 2017 – Jul 2019*

*Pre-university education*

Honors Youth Program, School of Gifted Young

*Sept 2019 – Jul 2023 (expected)*

*Bachelor of Science in Physics*

Honors Science Program (Physics), School of Physics

GPA: 3.89 / 4.3 (90.46 / 100) | Ranking: 2<sup>nd</sup>/200 (School of Physics)

*Core Courses:*

Optics (95/100)

Contemporary Physics Experiment (98/100)

Calculus-2 (95/100)

Methods of Mathematical Physics (91/100)

Atomic Physics (97/100)

Basic Physical Experiment (98/100)

Thermal Physics (98/100)

Probability Theory (96/100)

*Aug 2021 – Dec 2021*

**The University of California, Berkeley (UCB)** | CA, US

The Berkeley Physics International Education (BPiE) program

GPA: 4.0 / 4.0 | Grade Level: A

*Core Courses:*

Quantum Mechanics (A+)

Introduction to Statistical and Thermal Physics (A)

Introduction to Computational Techniques in Physics (A)

TOEFL iBT 108/120 (Reading 28, Listening 26, Speaking 25, Writing 29)

GRE 320/340 (Verbal: 150, Quantitative: 170, Analytical Writing: 3.5 / 6)

## RESEARCH EXPERIENCE

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*Aug 2018 – Aug 2019*

**Xi'an Jiaotong University** | Xi'an, P.R.China

*Contestant of the China Undergraduate Physics Tournament*

*Advisor: Prof. Shumin Zhao & Prof. Hongli Wang*

***Project: Fluid Suspension and its stability***

*Description:* A light cylinder will start to spin while being suspended near the edge of a water jet.

- Used the Navier-Stokes equation and boundary layer theory to build a theoretical model and proved that this effect is caused by the pressure difference.
- Solved the velocity field around the cylinder by numerical simulation.
- Designed and built the experimental device independently; Evaluated the stability of the suspension.

*Oct 2021 – Dec 2021*

**The University of California, Berkeley** | CA, U.S

*Research Assistant of Prof. Crommie's Group*

*Advisor: Prof. Michael F. Crommie, Department of Physics*

***Project 1: Poly-DBQA on Au(111) surface***

*Description:* Studied the behavior of the magnetic ground state of dibenzoquateranthene (DBQA) on a gold surface with scanning tunneling microscopy (STM).

- Learned to use Matrix-Assisted Direct (MAD) Transfer and Bottom-Up Approach to achieve an on-surface synthesis of poly-DBQA from precursor iodophenyl-bromobianthryl (PBA).
- Mastered many experimental skills of Scanning Probe Measurements, such as annealing, sputtering, transferring samples, and refilling liquid Helium and Liquid Nitrogen. etc.
- Learned to use software to control STM to get topographic images of poly-DBQA chains.

### ***Project 2: Five-fold structure on Au(111) surface***

*Description:* Proposed a method for synthesizing five-fold structures on a gold surface.

- Used the Bottom-Up approach to synthesize five-fold structures from five-membered ring molecules.
- Collaborated with my colleagues to get topographic images of five-point star structures by STM.

### ***Project 3: Single strands of deoxyribonucleic acid (DNA) on Au(111) surface***

*Description:* Studied the behavior and structure of single strands of DNA on a gold surface with STM.

- Used MAD Transfer to finish the on-surface synthesis of single strands of DNA.
- Collaborated with my colleagues to get topographic images of single strands of DNA by STM.

***Mar 2022 – Now***

**Xi'an Jiaotong University | Xi'an, P.R.China**

*Research Assistant of Quantum Many-body Physics and Quantum Information in Cold Atoms Group*

*Advisors: Prof. Yongchang Zhang, School of Physics*

### ***Project: Rydberg atomic system and quantum nonlinear optics***

*Description* Couple Rydberg atoms and photons to create interactions between coupled systems. Therefore, we can use this property to realize the function of a qubit gate.

- Reproduced the derivation of the Hamiltonian matrix of the Rydberg atomic system.
- Collaborated with my colleagues to design and co-propose the realization of qubit gates through the interaction of Rydberg atomic systems coupled with photons.
- Used MATLAB to conduct numerical simulations of the Rydberg atomic system, such as the energy distance relationship and time evolution of dark-state polariton.
- Developed a better understanding of photon-mediated atomic interactions from numerical simulation.

## **PUBLICATIONS & MANUSCRIPTS**

- 1 **Kaiming Liu**, Yajie Zhou, Shumin Zhao, Hongli Wang. Fluid suspension and its stability[J]. *Physics Experimentation*, 2021, 41(03): 46-53+58. DOI:10.19655/j.cnki.1005-4642.2021.03.010
- 2 Peter H. Jacobse, Michael C. Daugherty, Kristiāns Čerņevičs, Ziyi Wang, Ryan D. McCurdy, Reis Dorit, **Kaiming Liu**, Jiaming Lu, Oleg V. Yazyev, Felix R. Fischer, Michael F. Crommie. Decoupling localized modes in nanographenes. Manuscript in preparation.

## **SCHOLARSHIP & AWARDS**

2019 China Undergraduate Physics Tournament Northwest Division (*The First Prize*)

2019 China Undergraduate Physics Tournament Finals (*Grand Price, Top four teams of China*)

2020 Mathematical Contest in Modeling in China, Shannxi Division (*The First Prize, 1% of 500 teams*)

2020 Xi'an Jiaotong Academic Scholarship (*Awarded to undergraduates with great performance in research*)

2021 Mathematical Contest in Modeling (*Meritorious Winner, Top 7% of 20,000 teams worldwide*)

2020, 2021 Everest Scholarship, Xi'an Jiaotong University (*Highest Honor in the School of Physics, top 1%*)

2021 National Scholarship (*Highest scholarship awarded by the Chinese government, Top 20 students out of 16000 undergraduates*)