

# JIARUO LI

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## EDUCATION

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**Massachusetts Institute of Technology, Cambridge, MA** September 2021 - June 2027  
Ph.D in Physics  
**Cornell University, Ithaca, NY** May 2021  
Bachelor of Arts in Physics  
Bachelor of Arts in Math GPA 3.877

## RESEARCH EXPERIENCES

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**Department of Physics, Massachusetts Institute of Technology** Fall 2021 – Present  
*Independent study, Professor Riccardo Comin's group*

- Using MOKE (Magneto-Optic Kerr Effect) to study magnetic and electronic structure of two-dimensional materials

**Department of Material Science and Engineering, Cornell University** Spring 2018 – Spring 2021  
*Independent study, Professor Andrej Singer's group*

- Developed a data analysis method to extract spin density wave (SDW) order formation dynamics from raw X-ray diffraction data in ultrafast pump-probe experiments and used the method to investigate time and pump fluence dependence of the SDW formation.
- Studied the role of phonon in SDW formation in chromium thin film and the limitations of previous theories and experiments. (first-author paper under review of *Nature Physics*)
- Participated a five-day remote X-ray speckle interferometry experiment on metal-insulator transition in  $\text{Ca}_2\text{RuO}_4$  at SLAC National Accelerator Laboratory. Analyzed experimental data real time and supported to adjust experimental plan.

**Department of Applied and Engineering Physics, Cornell University** Spring 2019 – Spring 2021  
*Research assistant, Professor Gennady Shvets' group*

- Designed a multi-resonant and highly penetrative plasmonic metasurface with double penetration depths for biosensing for a NIH proposal. Optimized the design using COMSOL Multiphysics to achieve penetration length 10 times longer than previous designs in the group.
- Currently designing an experiment to measure the high penetration depth.
- Used experimental tools including e-beam lithography and scanning electron microscope (SEM) at clean room in Cornell NanoScale Science & Technology Facility to fabricate metasurface samples for metasurface-enhanced infrared spectroscopy for biosensing experiments.
  - Simulated the spectrum of the sample (co-authored manuscript in preparation).
- Performed biology experiments including cell culture, and freezing and thawing cells and maintained a cultured cell line.

**Rice Research Institute, Hunan Academy of Agricultural Sciences, China** Summer 2019  
*Research assistant, Professor Peisong Hu' group*

- Analyzed the dependence of seed germination rate and seed vigor on rice subspecies and sample store time using principal component analysis and analysis of variance.

**International Summer School for Young Physicists, Perimeter Institute** Summer 2016  
*Summer Program*

- Programmed a Monto Carlo based simulation on BCS superconductor under different temperatures using Python.
- Participated in an institute-scale poster session and oral presentation with fifty audience.

## PUBLICATION & MANUSCRIPT IN PREPARATION

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1. **Jiaruo Li**, Oleg Yu. Gorobtsov, Sheena K. K. Patel, Nelson Hua, Benjamin Gregory, Anatoly G. Shabalin, Raj Medapalli, Stjepan Hrkac, James Wingert, Devin Cela, James M. Glowina, Matthieu Chollet, Diling Zhu, Eric E. Fullerton, Oleg G. Shpyrko, Andrej Singer. (2020). *Phonon-assisted formation of an itinerant electronic density wave*. Unpublished manuscript. (arXiv link: <http://arxiv.org/abs/2012.05353>, under review of *Physical Review X* )
2. Steven H. Huang, **Jiaruo Li**, Zhiyuan Fan, Robert Delgado Gennady Shvets (2021). Monitoring live cells through metasurface-enhanced infrared spectroscopy. *Lab on a Chip*, 21(20), 3991-4004.

## CONFERENCE

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- APS March Meeting 2021
- Oral presentation: *Phonon-assisted formation of spin density wave in Cr thin film*
- Caltech FUTURE 2020
- Nomination-based conference for prospective Caltech graduate women in physics

## HONORS & GRANTS

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- Peskoff Physics Fellowship Fall 2021 – Spring 2024
- Dean's list, College of Arts & Sciences, Cornell University (all semesters) Fall 2017 – Spring 2020
- Research Assistant Funding, MSE Department, Cornell University (\$1,000) Summer 2020
- International Students Summer Internship Stipend, The Cornell Commitment (\$1,000) Summer 2020
- Summer Experience Grant, Career Development Center, Cornell University (\$2,000) Summer 2019
- Research Assistant Funding, MSE Department, Cornell University (\$2,000) Summer 2018

## RELATED PROFESSIONAL SKILLS

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**Computer Skills:** Python, Java, MATLAB, COMSOL Multiphysics, LabVIEW, Fusion 360, Adobe Illustrator and Photoshop

**Laboratory Skills:** 2D device fabrication, Magneto-optic Kerr effect measurement; Electron-beam lithography, computer-aided design (CAD), around 100h clean room experience, SEM imaging, Electron-beam evaporation, ion milling, resist stripping; cell culture, cell freezing

## MENTOR EXPERIENCE INVOLVEMENT

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- Peer mentor, Cornell Department of Physics Fall 2020
- Popularity Award in Photography Contest, Cornell Chinese Students Association August 2020
- Cornell Eastern Music Ensemble Fall 2018 – Spring 2020
- Cornell Badminton Club Spring 2017 – Spring 2020

## ADVISORS

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Ph.D Advisor: Dr. Riccardo Comin

B.S. Advisor: Dr. Andrej Singer, Dr. Kin Fai Mak (physics) and Dr. Reyer Sjamaar (math)