Kaimeng Liu

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EDUCATION

University of Wisconsin Madison **WI, U.S.**
Department of ECE
Ph.D. of Engineering ***09/2025- Present***

- Research focuses on quantum materials and their properties.

PEKING University **Beijing, China**
Department of Physics
Bachelor of Science in Physics ***09/2020- 06/2024***

- Overall GPA: 3.6/4.0
- Relevant Courses: Quantum Mechanics(A), Equilibrium Statistical Physics(A), Electrodynamics(A), Solid State Physics(A)

RESEARCH INTERESTS

- Two-dimensional semiconductor material
- 2D semiconductor device
- Quantum materials

RESEARCH EXPERIENCES

The Yan Xueqing Research Group GuangZhou, China

The research group of Professor yanxueqing and Professor zhukun from Peking University is working on new micro-ion sources and three-dimensional packaging of chips using femtosecond lasers for improving the performance of ion implantation and manufacturing higher-performance chips.

Undergraduate Research Assistant, Advisor: Prof. Zhu Kun ***07/2023-08/2023***

- **Project: Advanced ion source design**
  - Helped PhD students to complete the design of micro ion source and ion filtration device, and helped to carry out subsequent testing and improvement.
  - By changing the electrode voltage in the ion filter device, the ion beam with single composition can be obtained.
  - explored the role of the use of Magnetic Multistage Confinement in plasma generation.
  - Worked based on Cai Shixian/Huang Wei.

The Chen Qing Research Group Beijing, China

The research group of Professor chenqing from Peking University is working on Two-dimensional materials and two-dimensional semiconductor devices and can be used for the new generation of artificial intelligence hardware design.

Undergraduate Research Assistant, Advisor: Prof. Chen Qing ***10/2023- 06/2023***

- **Project: Study on the preparation and properties of two-dimensional materials**
- Assist PhD students to prepare semiconductor devices and perform electrical characterization.
- The curve of drain current of IN2SE3-carbon nanotube heterojunction with respect to gate voltage is a butterfly loop and the device has good memory characteristics.
- Looking into how to quickly determine the In2Se3 layer number using light microscopy
- Worked based on Li Xuan/Li Shuo.

SCOPE LAB **TX, U.S.**

The research group of Professor Shengxi Huang from Rice University is working on developing nano and quantum materials with unique properties through innovative processing techniques and exploring novel optical and electronic properties of these materials, like enhancing Raman spectroscopy signals using 2D materials

Short-term Academic Scholar, Advisor: Prof. Shengxi Huang ***08/2024-12/2024***

- **Project: Raman spectroscopy and Raman enhancement**
  - Helped PhD student to analyze data and experiment about Raman spectrum and material preparation.
  - Investigated the Raman spectrum of STO thin films under different conditions. Analyze low wave number PL peaks at low temperatures and discovered two undocumented PL peaks with irregular relative intensity versus temperature.
  - Studied the interface interaction between BLFO and SIO on a DyScO3 substrate. Found that peak intensity does not vary significantly with the magnetic field, but identified peaks at high wavelengths that were traced to silver introduced during substrate preparation.
  - Fitted the spectrum and mapped the intensity graph of CMG with CUPC films deposited on it, finding an association between surface terrain and CMG's Raman enhancement effect.
  - Did some literature research about the differences of Weyl cone energy between CMG and other meterials.
  - Improved the simulated Comsol model about SERS and the simulation results accord with the expectation to some extent. Summarized the influence of surface features on EF is and further simulated.
  - Worked based on Xielin Wang.

Nanoscale Quantum Materials and Devices Lab WI, U.S.

The research group of Professor Ying Wang at the University of Wisconsin-Madison focuses on exploring the unique quantum transport and light-matter interactions in low-dimensional and topological quantum materials.

Graduate Research Assistant, Advisor: Prof. Ying Wang ***09/2025- Present***

- **Project: Printed Graphene THz Detectors for Scalable Neuromorphic Imaging**
  - Characterized the THz photoresponse of aerosol-jet printed crumpled graphene, demonstrating a pure bolometric detection mechanism driven by zero-bandgap physics.
  - Utilized lock-in amplification under 0.1 THz radiation to isolate the photoconductive response, analyzing broad gate tunability to rule out dominant photo-thermoelectric (PTE) effects.
  - Extracted a DC responsivity of 20 V/W and identified a thermal time constant of 20 ms, which is much better than exfoliated graphene.
  - Going to use a redesigned antenna geometries to boost responsivity and prototyped fully printed 2D arrays to enable scalable, in-sensor THz visual processing.

- **Project: Nonlinear Dynamics in Superconducting NbSe2 Nanomechanical Resonators**
  - Investigated the mechanical resonance and nonlinear dynamics of two-dimensional Niobium Diselenide (NbSe2) nano-oscillators at cryogenic temperatures.
  - By conducting precise temperature and magnetic field sweeps, the superconducting transition (Tc) is successfully detected through purely mechanical responses, specifically shifts in resonant frequency and the quality factor.
  - Analyzing the Duffing nonlinearity coefficient reveals vortex-induced stiffening caused by the coupling between the applied magnetic field and the mechanical motion.

- **Project: Strain-Tuned Raman Spectroscopy of 2D Magnetic CrSBr**
  - Designed and manufactured a custom mechanical strain cell for in-situ uniaxial stretching of two-dimensional materials.
  - Investigated the strain-dependent vibrational properties and structural evolution of the 2D magnetic semiconductor CrSBr.
  - Discovered significant Raman peak shifts and peak splitting under applied strain, indicating strain-induced crystal symmetry breaking and strong spin-lattice (magnetoelastic) coupling.
  - Correlated the optical spectroscopy data with mechanical deformation to uncover the fundamental phonon dynamics of the CrSBr system.

- **Project: Quantum Emission in Thin-Layer Topological Material TaIrTe4**
  - Investigated the optical properties of the thin-layer topological semimetal TaIrTe4 and observed sharp, high-intensity emission peaks strongly indicative of Single Photon Emitters (SPEs).

- Characterized the photoluminescence signatures, revealing a pronounced dependence on incident light polarization and emission frequencies strictly proximate to the excitation source.
- Monitored the temporal optical dynamics, recording distinct "blinking" phenomena characteristic of localized quantum state transitions and individual quantum emitters.
- Explored the potential of integrating 2D topological materials into robust, high-brightness nanophotonic platforms for advanced quantum information processing.

SKILLS

- **Programming Languages:** Proficient in C Language, C++, Python,
- **Software Tools:** COMSOL, Origin, can use MATLAB and python for some work.